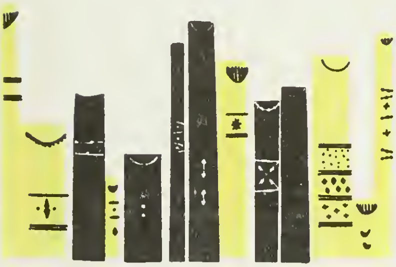
reference collection book

kansas city
public library
kansas city,
missouri



From the collection of the

z n m
o Prelinger
v Library a
t p

San Francisco, California
2008

Bell

TELEPHONE MAGAZINE

JANUARY-FEBRUARY 1972

Bell
TELEPHONE MAGAZINE

VOLUME 51 NUMBER 1 JANUARY/FEBRUARY 1972

2 **A Long Look Ahead**
Some significant predictions about regulation, social change, new and existing services and Bell System people. From a report by the Institute for the Future.

8 **Measuring the Job**
By Robert M. Gryb
Measurements help make the business move, but there's room for vast improvement in the way they're interpreted.

11 **The Corporate Stake in Urban Transportation**
By Howard Quick
The transportation mess in many major American cities is costing the Bell System and other businesses heavily in money and manpower.

20 **Forecasting the Labor Force**
Who will all the people be? Where will they live and work? What will they do? A look at the human side of the System in the 1970's.

24 **The Operators**
By Donald R. Woodford
How a Washington, D.C., traffic team consistently turns in top performances.

28 **The New Loyalty**
By John R. Bonée
Are faithfulness and fidelity things of the past, or are people simply shifting their allegiance? An Illinois Bell P.R. man and former priest explores the issue.

H. I. Romnes
Chairman of the Board and President
John D. deButts
Vice Chairman
Robert W. Ehrlich
Secretary
John J. Scanlon
Treasurer

Tim Henney
Editor
Al Catalano
Art Director
Donald R. Woodford
Managing Editor
Marco Gilliam
Associate Editor
Thomas J. Fay
Associate Editor
Robert L. Buchanan
Associate Editor

Published by
American Telephone
and Telegraph Company
195 Broadway,
New York, N.Y. 10007
212 393-8255

A Long Look Ahead

An independent research organization predicts a different world of work for members of the telephone industry

Of all the difficult and demanding functions of management, perhaps the most artful is that of anticipating tomorrow. With all the computers and modern methods of extrapolation, business managers still must admit that nobody knows with certainty what the future will bring. Yet, people must prognosticate, if planning is to be realistic. With this in mind, AT&T, coping with technological and sociological changes and increasing demands and challenges, undertook sponsorship of an extensive study of the long-range future of the telephone industry and its potential interaction with some specific projected changes in society. The study was conducted by the Institute for the Future, an independent nonprofit research organization.

Five general subject areas were covered—Regulation, Social Change, Existing Networks and Services, New Communication Services and Networks, and Characteristics of the Labor Force and Employee-Management Relations. The results of the study suggest that the future of the telephone industry will be both dynamic and different.

The final report, issued recently, was written by Paul Baran and Andrew J. Lipinski, two of the senior researchers of the Institute for the Future at Menlo Park, California. The Institute was founded in 1968 to conduct systematic and comprehensive studies of the long-range future in the public interest, and the AT&T-sponsored study was started in mid-1969. The report summarizes the anonymous views of technical experts selected individually for their personal technical knowledge and not as representatives of any organization. Respondents came from a large number of organizations, including the Bell System. Baran and Lipinski point out that nothing in their study can be interpreted as being representative of the position of any particular entity —including the Bell System. Moreover, the views expressed in the report deal only with *probability* of developments rather than with their desirability or lack thereof.

Early in the report the reader is reminded that in dealing with the future, the researcher's only possible source of information is *opinion*. "Such opinions should not be treated as statements of hard facts," says the report. "Only a 1970 image of

Changes on the horizon: more competition, shifts in system of values, public dissatisfaction

Future of the industry may depend more on its ability to adapt

Revenues should reach $65 billion by 1985, including $5 billion from Picturephone® sets and perhaps $10 billion from new services to homes and businesses

As many as 30 new interstate carriers may be authorized

1985 reality is presented here. . . . In short, the following caveats should be kept in mind:

- No single estimate should be fully believed.
- The over-all trend of the data should not be disregarded."

In very general terms, the expert judgments accumulated in the study seem to suggest that the future of the telephone industry appears secure. Major growth is anticipated in many sectors of the business, and the services provided by the industry are not at variance with the long-term goals and needs of any major sector of society.

There are, however, some changes on the horizon, almost all originating outside the telephone industry. These are:

A movement to a form of competition in some sectors of the business; shifts in the nation's value system; an undercurrent of public dissatisfaction with all industries, especially the more regulated ones; increasing adversary encounters with some previous supporters of the telephone business.

The fundamental changes seem to hinge on a redivision of power among various sectors of society. It seems likely that the telephone industry will be able to live with the changes that appear to be coming down the road—but with varying degrees of comfort, Baran and Lipinski write.

"The world of 1985 will be markedly different from today's, and the future of the telephone industry may depend more on its ability to adapt to a changed environment than on its doing well in responding to the old tasks of the business. Among the major challenges for the 1970's will be that of working out a mutually satisfactory accommodation with a new generation of employees and a new generation of the public, increasingly distrustful of all institutions," the report says.

The experts who participated in the study tended to believe that the following key events would epitomize their view of the most likely future of the industry in 1985:

The telephone industry will continue to grow steadily during the next 15 years, reaching overall revenues of about $65 billion, of which telephones will account for about $50 billion, Picturephone® sets possibly $5 billion, and new services to home and business perhaps $10 billion. (All dollar estimates presented in the report are in terms of constant dollars.)

In 1985 there will be more than 200 million telephones and three million Picturephone sets in the United States. About two-thirds of the latter will be used mostly for data or information services. Some eight million data terminals will be connected to the public and other domestic networks.

Between five and 30 new interstate carriers will have been authorized, and perhaps four separate domestic special-purpose satellite systems will be in service. After several years of hearings, a new nationwide nonBell data network will be constructed.

Picturephone service will be widely used for broadband local area service, taking advantage of an economic breakthrough in local area wideband transmission, which will occur around 1975.

The regulatory climate will change, with competition expected in some sectors of the business. However, the telephone companies will be allowed to change to long-term marginal pricing in such competitive situations. Unambiguously sharp boundaries between the regulated and nonregulated sectors of the industry are not expected. More litigation effort will be expended in adversary proceedings.

Time-division switching of telecommunications traffic will begin to appear in the public switched network, which will be increasingly "digitized." Nearly half of all interexchange trunks will be served by the time-division systems by 1985.

At least half a dozen specialized data communication networks will serve nearly 200,000 terminals, and most of them will use some facilities of the public switched network.

New information services to the home will be a major industry, with potential revenues in 1990 exceeding $15 billion. However, this new industry will be slow in coming and will not take off until about 1980.

Some social trends that are expected to affect the industry are:

Telephone communication will be substituted for travel by many reluctant to risk violence at night in the large cities; the poor in high crime areas will regard the telephone as a necessity; public concern with the environment will become increasingly important; society will continue the trend of expanding social services such as guaranteed minimum income and cradle-to-grave medical services. Major federal investments in new towns and in mass public transit are likely.

Baran and Lipinski add:

"In the past, the telephone industry could concentrate on developing a homogeneous integrated telephone network, with little interference and second guessing from the public and the regulatory agencies. Now the broader task before the industry is to expand and upgrade the telephone network for more heterogeneous demands and to plan for the digital and video capabilities that will be required in the future. Further, it must do so in an environment where there may be markedly less freedom of action. In meeting these technical challenges, the industry will encounter changed attitudes of customers, regulatory agencies and employees. Customers are expected to become more critical of the telephone industry and to demand some say in its policies. Regulatory power also will continue to shift: from state regulatory agencies to the F.C.C.; from the commissioners of the F.C.C. to their staffs; from the F.C.C. to the Office of the President—and therefore will be more susceptible to short-term political pressure.

"Many of the values of the future United States population resemble more closely the values of today's college generation than those of the present world of corporate business. A major societal shift of importance will be the rise of a new labor force with a different value system than that of the dedicated, career employee who has formed the cornerstone of the industry in the past. Corporate policies and motivation-and-reward procedures will be redesigned to meet these changes. To convince the consumer and, for that matter, the employee that the communications industry is serving the public interest and that the employee's role within that company meets a socially useful need may even become management's primary task in the future."

In collecting the information that led to these conclusions, the institute elicited expert judgment through iterative, anonymous questionnaires. In organizing and analyzing the information, many methods, some formal, some empirical, were incorporated. Collected data were transferred to more than 40,000 I.B.M. cards, then manipulated by some 30 separate computer programs written primarily for the AT&T project and using a variety of separate computing systems. The results were a foot-thick stack of computer analysis printouts, which were analyzed by the research team.

More than 500 multiple-part and graphical questions were asked in the study. In posing the questions, a balance was sought between optimistic and apocalyptic futures, with no bias intended either way.

Many of the forecasts presented in the report are in the form of the respondents' evaluation of the *likelihood* of a hypothetical event, its *importance* (if it were to occur), and the respondents' *self rating of expertise* with regard to the subject matter under study.

Baran and Lipinski admit that regardless of the techniques used to aggregate information into a final analysis, the conclusions of the analysis remain subjective.

The data base developed in the study constitutes a valuable source of information that lends itself to further analysis. Therefore, the data have been turned over to the AT&T Management Sciences Division.

Five panels of respondents were selected to provide data on the five major subjects of study.

REGULATION: The panel on *Regulation* generally felt that:

Regulatory conflict will be greatly increased in the future across the boundary between the regulated and unregulated sectors of the business. Tariffs based on long-run incremental costs will be allowed in competitive situations. AT&T participation in unregulated business is unlikely. Network deterioration by customer-owned and maintained

The telephone network must be expanded for more heterogeneous demands

Customers may become more critical of the industry, demand a voice in policy; regulatory power will shift

Policies will be redesigned for a new labor force

Management faces a new primary task: to convince the consumer that the public interest is being served; to convince the employee that his role is socially useful

Regulatory agencies will be increasingly involved in long-range goal setting; telephone companies will be required to disclose more planning data to the public

Allowable earnings may be increased to permit a higher rate of growth

Reliance on equity financing will remain about the same

Bigness of the telephone system is not, in itself, a prime source of customer discontent; rather, size should make for excellent service—failure brings greatest dissatisfaction

equipment also is not likely. The chance of all regulation being abolished is very low.

Telephone tariffs will be allowed to meet *cream-skimming* competition on high-density transmission routes. Most of the panel thought that there will be no shortage of transmission facilities, with normal expansion believed to be adequate. (There was a sizable group in the regulatory panel that felt there might be such a shortage, but the more technically oriented panels disagreed with this.)

Among other forecasts of the panel on *Regulation:*

No automatic metric will be developed to determine a mutually satisfactory rate of return for regulated industry. Regulatory agencies will be increasingly involved in long-term goal setting. Penalties for not maintaining service standards are more likely than not, as is the chance of the regulatory agencies, explicitly recognizing superior service. It is less than likely that excellence can be directly rewarded. Telephone companies will be required to disclose planning data to the public. Regulatory agencies will continue to conduct lengthy hearings in determining rates-of-return.

It is more likely than not that allowable earnings will be increased to permit the industry to achieve a higher growth rate. The demand for new telephone services probably will not be impeded by a critical shortage of capital. It is likely that new capital for telephone business will be raised by about the same reliance on equity financing.

The regulatory panel assigned a low probability to a set of developments that could be described as *enlightened regulation.* These developments include a trend toward nonadversary-type proceedings, mutual goal setting and rewards for superior performance. Such developments probably will not occur because of difficulties in determining what constitutes superior performance and a fair rate of return. The difficulties derive from a lack of mutual confidence among the public, the regulators and the regulated industries. Distrust of institutions was believed to be one of the most rapidly increasing social trends for the years 1970 through 1985. The panel foresaw power shifts in society from white to black, old to young, executive to staff, line (top) to line (bottom), employer to employee, rural to urban, rich to poor, employed to unemployed, senior employee to junior employee and teacher to student. Other power shifts are expected from industry to government, state government to Federal Government, regulated industry to regulators and producer to consumer.

SOCIAL CHANGE: The summary of consensus views on *Social Change:*

Trends most likely to increase rapidly by 1985 include concern with the environment, consumerism and desire for work to be creative and satisfying. In 1985, residential users will regard human factors as the most important aspect of telephone service, while business users will be primarily concerned with technical considerations. Both residential and business users will be less concerned with financial aspects of service than they are at present. Bigness of the telephone system is not, in itself, a prime source of customer discontent. On the contrary, it is felt that the size of the System should make possible excellent service, and it is the occasional failure of this service that produces the greatest customer dissatisfaction.

International communications will continue to grow at an annual rate of more than 20 per cent through 1985. An increasing fraction of teen-agers will have their own telephones. Suburban growth will continue. A wide dispersion of homes (living beyond suburbia) will become a rule rather than an exception for high-income people. Video appointments will begin to replace travel, with video appointments constituting at least 1 per cent of business appointments by 1985. High income people will want the video connection to the home to terminate in high-definition, wide-screen color displays.

Police will not be able to offer security for employees who want work in high-crime areas. It is unlikely that telephone companies will have to withdraw public telephones from such areas. Instead, to prevent destruction, vandal-proof telephones will be developed. At least twice the number of letters of complaint received in 1970 will be generated annually by 1985, even if the number of service failures remains the same. That is, the rate of complaints per failure will double. Equal or preferential hiring and promotion of nonwhite minorities appear likely. A substantial fraction of the personnel in research laboratories of the telephone company will have academic backgrounds in social psychology and related disciplines.

EXISTING NETWORKS, SERVICES: The panel on *Existing Networks and Services* felt that the telephone industry will continue to grow at a rapid pace and will have revenues about 200 times greater than those of new network carrier entrants. Telephone service will become faster and more reliable, with speed of toll service improving and the fraction of failed attempts to complete a call declining. The fraction of incompleted long distance calls may remain constant through 1985 but possibly will decrease by the year 2000.

Data terminal growth will be large, increasing from 600,000 terminals in 1970 to about eight million by 1985. Time-division switching may eventually eclipse present-day ESS switching in some parts of telecommunications plant. The Bell System is virtually certain to continue to offer its own data services despite creation of a nonBell data network. An alternative to multipair distribution from central office to subscribers seems possible, perhaps using a technique such as round-robin wideband loops connecting several data subscribers.

NEW SERVICES AND NETWORKS: Substantive findings of the panel on *New Communication Services and Networks* indicate that several new information networks that may emerge prior to 1985 are likely to use the public switched network, including, for example, a banking system for *cashless society* transactions. The public switched network will be considerably modernized by 1985, with widespread installation of such developments as time-division switching, stored-program electronic control and data link signalling channels. Microwave radio will continue to carry the majority of interexchange voice trunks, but the use of satellite circuits and high-capacity waveguide buried transmission systems will increase.

A number of new telecommunications services are likely to be offered in the future, particularly to the home. Prime examples include plays and movies from a video library, computer-assisted school instruction and facilities allowing executives to work at home rather than commute. Such new services are unlikely to generate sizeable revenues before 1980, but revenues are expected to rise rapidly thereafter, reaching almost $10 billion per year by 1985 and nearly $20 billion by 1989.

The panel foresaw several new nationwide networks that may have an impact on the public network. The nonBell networks would be used for stock certificate clearing; biomedical work; motel/hotel reservations; police/crime prevention; educational activities; post office operations, and credit card verification.

LABOR FORCE, RELATIONS: The panel on *Characteristics of the Labor Force and Employee-Management Relations* appeared to agree that likely developments in the future might include:

Compulsory arbitration in critical industries. In most industries, the four-day workweek will supplant existing work schedules. The future labor force in the United States will be better educated at all levels, as a result of better education for all, but there will continue to be a large residual of marginally employed workers and welfare-dependent families. The service sector of business probably will match the manufacturing sector in wages and benefits. Flexible work hours will become common. Improved management understanding will allow employees on all work levels greater job satisfaction.

Part-time, low-skill employees will be hired by large firms because of scarcity of unskilled workers able to work full-time. Yet, more likely than not, obsolescence of skills will force many able and willing people to retire early. Large corporations will increasingly have problems making employees believe in their organizations. Personal, individual loyalties to one another among executives and highly skilled personnel will eclipse traditional loyalty to the company. Among new services for employees the panel considered highly likely are day care centers, which they expect to be provided on a wide scale by industry. A "Marshall Plan" of massive assistance for the cities, to be supported by the Federal Government, is likely. The Federal Government probably will invest as much as $10 billion in development of new towns.

In the cities, black political participation will be better organized. The middle class will continue to move from the inner cities to the suburbs. The crisis of discipline in central city schools will continue. There will continue to be a large residual core of poor and welfare-dependent people in the central cities. The young will continue to gravitate toward the cities. The main policy objective of blacks in the United States will be to achieve middle-class economic status.

The panel felt it to be about as likely as not that riots and guerilla warfare incidents will be common in at least one of the major cities at any given time, but that it is not likely that inner city services will have to be conducted by armed employees in armored vehicles, as predicted by the Eisenhower Commission. It is not likely that the proportion of black and Spanish-surname minorities in management in large corporations will equal their percentage of the national population.

Baran and Lipinski conclude: "It is hard to imagine any single technology having as great an impact on society as that which has been wrought by electrical communications. The telecommunications industry has rapidly become a vital part of our society and a major agent for social change. As recently as the mid-19th century, sending a message across the Atlantic required a month's sea voyage. Today, instantaneous transnational telephone communications are readily available, and the promise of further developments, such as Picturephone service, is almost taken for granted. . . . Just as telecommunications affect society, so do society and its evolving value systems affect the nature of telecommunications." ■

"What we probably need most in this world of measurements is a measurement that measures how well people interpret measurements."

Measuring the Job

by Robert M. Gryb

Even before we are born, we are a statistic. Someone is always trying to forecast from various factors whether we are going to underrun or overrun the nine-month average. Then, after getting that first—and too often our last—spanking, someone puts us on a scale, takes our footprints, measures our length, checks the pulse and includes us in a birth rate. Then, for the rest of our lives, we are involved in measurements—report cards, I.Q.'s, batting averages, budgets, earnings, accomplishments and death rates.

All of this is necessary and important and has brought about some useful statistics for scientists, educators and businessmen to analyze and use in making improvements. Without these measurements, we would not have many of the medical, scientific and social benefits of today. For example, listed in the 40 greatest accomplishments in social science in this century are Keynesian economics, opinion polls, statistical sampling, input-output economics, operations analysis, information theory, feedback theory and theory of games—each a modern form of measurement.

Business, in order to be successful, must have measurements, too. They are a vital part in the feedback loop for determining whether or not we are on course. Most business activities start out with goals and objectives, which lead to practices and techniques, which are finally implemented to render a product, service or result. The only way to know whether the result is consistent with the original goals and objectives is to somehow measure it. Based on the measurement, the decision is then made to either alter the goals and objectives or change the practices and techniques. In the telephone business as well as in many other businesses, this feedback is more than just a control statistic. The way it is used can be a powerful stimulus for improvement.

Some of the things people do today—and really enjoy doing—would be considered monotonous, repetitive or a waste of time if it were not for measurements. For example, a man driving golf balls on a driving range over and over again into a fog so dense he could not tell how far the balls flew or how they hooked, would rapidly lose interest. Nor would a baseball pitcher keep throwing the ball as fast and developing better techniques if no one bothered to keep score.

Measurements can convert routines into challenges for self improvement. They help us realize that what we are doing can perhaps be done better by knowing others have actually done better. The instinct for competing with oneself as well as with others is an important aspect of measurements. Because of this instinct, it is important to consider *what* is measured, what the measurement *means* and how the results should affect judgment.

Measurements occur in almost every part of the telephone business. Many are technically oriented to insure that loads are consistent with the design parameters of the equipment and network—that loads are balanced, that there is not too much and not too little margin for the unpredictable. Other measurements are designed to evaluate service delivered to customers in terms of such specific values as time delays in seconds and transmission levels in decibels. Still other measurements analyze such subjective values as courtesy and interest. There are also measurements oriented toward efficiency and accuracy in the performance of the job. But each measurement is intended *to help someone do his job better.*

When comparisons are made, however—and this can be true when making comparisons in time as well as geographic location—what is too often overlooked is the difference in the measurement *environment*. For example: There can be no question about the fact that batting averages are accurate, statistically valid measurements. All ball clubs use the same rules for counting hits. However, a boy in the little league with a batting average of .450 may be inclined to compare himself with Mickey Mantle or Willy Mays and convince himself in a naive way that he is better than they are because his average is higher. Similarly, a complete stranger from some far-off land could look at a page of baseball statistics, batting averages, stolen bases, etc., and conclude that the Harper Valley Midgets could thoroughly whip the San Francisco Giants. The statistics are accurate, but the environments in which they were achieved are so radically different that the results must be interpreted differently if they are to be useful. These are examples where the challenge is a function of age or size.

Different levels of need

Another kind of example would be a person who bowls in a company league and is delighted that his average score is 170. That the professionals average 225 doesn't bother him at all. His needs are well satisfied, and he could not justify practice and effort for greater perfection, because he is not trying to make a living at it. This is an example of different levels of need, or relative importance.

Telephone companies have entities, groups of people, cities or other geographic segments that have these same basic differences in their measurement environments, too. And they are constantly changing. Among the factors affecting telephone measurements are the number and types of customers, how they are concentrated, growth factors, economic factors and individual personal needs.

Each individual customer or group of customers has different requirements. Some cases require complex equipment with a high degree of flexibility, or perhaps higher volatility in load, justifying greater margins. In contrast, there are customers with the need for reliable but relatively simple equipment with steady, highly predictable load patterns. When measuring absolute values of performance, these environmental measurement factors must be considered.

When these entities – or "universes" as statisticians like to call them—are radically different, there is usually no problem in recognizing the reasons for differences in measurements. But most measurable universes are composed of many types of customers, which have an effect on the over-all result. There is a great statistical field in itself for making correlations and isolating these factors, but in most of the less sophisticated applications it is left to the user to take these into consideration. Unfortunately, it is easier to ignore these differences than to understand them. As a result, what should have been an incentive for improvement has too often become disillusionment or discouragement because of comparative judgments made without all of the facts.

What we probably need most in this world of measurements, is a measurement that measures how well people interpret measurements. Measurements that are originally designed for feedback information and to put challenge into what could become a routine task are too often handy statistics to use as comparisons between functions that are dissimilar.

We joke about a good salesman selling refrigerators in Alaska. But it's no joke when his sales performance is compared to a fellow selling refrigerators in Florida.

Telephone companies, above all other enterprises, are dedicated to rendering the right kind of service, in the right way, at the right time, in the right amount. We rely on measurement feedback to help us make these determinations. But the key word is *right* and not *same*. Some customers need more superb service because they use it heavily, and the effect of any irregularity becomes multiplied by usage. Their business efficiency may depend on it. They have more sophisticated equipment installed, pay more and expect more than, say, a customer who makes one call a week.

Service challenges vary

This is not to say that the one call a week is not a very important one. The challenge for providing the right service in each of these cases is different, however. Population density, for example, is a significant factor. Densely populated areas with congested conduits in high rise buildings are some of the environmental measurement factors affecting installation and repair work. And in high crime areas—usually densely populated—some customers nowadays tend to leave receivers off the hook when absent from the apartment, so they would appear to a caller to be home. Coping with this new custom in the design and provision of equipment is difficult, to say the least. By contrast, what happens in some less populated places, because of the highly predictive nature of the load, is that service results may be better simply because there are fewer surprises.

The truth, like a diamond, has many facets. And if we think that the divergences we now experience are only temporary, and time will tend to make us more uniform, we should think twice. Indications are that these divergences are rapidly becoming more pronounced.

Careful identification of the universes to be measured, and of the method of acquiring the basic data to be used, are essential elements affecting not only the costs of measurement, but the uses of measurement. We are all dedicated to doing our job better. We should work together to make sure we have valid measurements to help achieve that worthwhile objective.

Mr. Gryb is Operations Director—Service Measurements, at AT&T. A graduate in electrical engineering of the University of Illinois, he joined New York Telephone as an engineer in 1946. His Bell System service includes 10 years with Bell Telephone Laboratories.

The Corporate Stake in Urban Transportation

by Howard R. Quick

Normally, when one talks about business involvement in transportation, reference is made to the directly related activities of transportation equipment manufacturers, purveyors of other goods and services to the transportation industry, transportation common carriers, shippers, large users of transportation services, transportation investment analysts and banking interests.

When relationships are defined in these terms, most companies concede a corporate involvement in transportation, if only as purchasers of transportation services and equipment. Unfortunately, this involvement frequently is construed in narrow terms or consigned within the corporate structure to a status of relative unimportance.

But this kind of direct economic involvement with transportation is, nevertheless, an important one. It is important because it helps to define an extensive though frequently neglected corporate stake in the development and implementation of transportation policy and planning.

In the case of the Bell System, the Western Electric Company alone, which is only one Bell System company, will this year spend an estimated $156 million in payments to air, water, rail and motor transportation carriers, automobile rental agencies, and to freight forwarders and consolidators.

This figure of $156 million represents a remarkable increase of 86 per cent above what Western Electric was paying just three years ago. And while precise figures covering total Bell System operations are unavailable, a conservative estimate of yearly expenditure for all types of transportation would be somewhere in the neighborhood of $550 million.

Contributing to these costs are the extensive trucking and shipping operations carried on by the Western Electric Company and the associated telephone companies through commercial transportation firms, and the fact that the Bell System's motor fleet—comprised of 152,000 automobiles, trucks and special purpose vehicles and valued at $523 million — is the largest privately owned fleet in the world.

It costs approximately $250 million a year just to operate this fleet of vehicles, which travels in excess of 1.4 billion miles annually and consumes more than 122 million gallons of gasoline. The size of such transportation requirements may be somewhat unique. But the nature of these requirements is not. Other companies have similar if smaller requirements for transportation services and equipment.

In addition to its direct expenditures for transportation, the Bell System has a further stake in transportation arising from the fact that its one million employees depend on public transportation facilities, roads and highways, not only to get to and from their jobs, but frequently in the performance of their jobs. The absence of accessible, reliable and safe modes of mass transportation is affecting both hiring and retention. Because inaccessibility stimulates requests for job trans-

fers, this is encouraging a high degree of mobility among telephone employees in some cities.

It is difficult to assess the economic costs involved here because of the absence of really hard data and because obviously there are other factors involved. Studies conducted in various Bell System companies show, however, that transportation is an important factor in shaping the attitudes of our employees toward their work locations. And the constant churning of people in and out of jobs, the loss of experienced employees—through resignation or transfer to more accessible locations—reduces efficiency and is expensive. On the average, it costs $2,800 to replace a trained employee.

The most severe employee transportation problems typically are found at inner city locations – in those areas of the central city surrounding the downtown business districts. Transit service in these areas is often poor, and usually there are no parking options other than curbside parking. The impact of transit conditions on hiring at these inner city locations is evident. Inner city Bell System offices tend to draw a high percentage (50-70 per cent) of their female employees from within a two- to four-mile radius of the office. In contrast, Bell

System offices in the downtown central business districts, where transportation access usually is the best, draw their employees from throughout the region and typically pull only between 10 and 20 per cent from nearby areas.

Many Bell employees who work at inner city locations choose to drive or ride in car pools because they travel from areas where transportation is unavailable, grossly inadequate due to scheduling, location of stops and overcrowding, or is too expensive. Often no public or company parking is available for these employees, so they park on the streets, adding to congestion and drawing the ire of homeowners and merchants. It is increasingly difficult for Bell System companies to find available land near inner city locations where suitable parking can be provided economically. Even where land is available it is often impossible to obtain necessary construction approvals because of strict zoning and highly vocal community opposition to plans.

Parking and traffic problems are not limited to telephone company locations. At Western Electric's Hawthorne Plant outside Chicago, which employs 24,000 people, there are 4,300 on-site parking spaces in addition to company-owned or leased off-site spaces. Approximately 3,800 employees are waiting for space assignment in these company lots. Some people have been waiting for six years because they want a space in a particular lot. In the interim they must resort to curbside parking, which creates community resentment, or incur charges for private parking lots.

The congestion in the company lots at Hawthorne during shift changes is pronounced. It is aggravated by the fact that the lots empty into a road system that includes a heavily traveled north-south thoroughfare. It takes 15-20 minutes to clear the lots and get into the street, a factor that adds significantly to employee travel time.

At suburban business locations, transportation problems, where they exist, are attributable ordinarily to management failure to give appropriate attention to transportation in the site selection and planning process. But problems also arise from inadequacy of *community* transportation planning, which frequently is limited at best in suburban communities, and from lack of funds for needed improvements. In recent years, the increasing practice of locating corporate facilities at suburban sites has come in for nationwide attention and much criticism.

Moves by corporations to the suburbs have been criticized because the elderly and low and moderate income people, many of whom are racial minorities, are left behind and denied access to jobs in the suburbs. They are left behind because housing in the suburbs is priced beyond their reach due to restrictive and allegedly discriminatory zoning practices, and also because they lack economical transportation to jobs at suburban locations.

In cases where the Bell System has relocated facilities to suburban locations, the business has, because of its size, been able to offer employees unable to move or commute an opportunity to accept alternative employment at System facilities in the city. Nevertheless, this business recognizes, as many other companies do, that the growth of jobs in suburban areas and the importance of providing access to these jobs—particularly for low and moderate income people and older people—is becoming an increasingly thorny national problem in the United States. It is a problem that efficient, reliable, high-speed transportation could do much to resolve.

Another aspect of transportation that is of special interest to the Bell System is nighttime transportation. Although the problems posed by night travel are not unique to this business, they are nevertheless of critical concern both to Bell and to the development of viable transit systems for urban communities.

In major cities throughout the United States hundreds of telephone operators are working late night and early morning shifts and must travel to or from work during hours of darkness. In many of the communities where operators work these late night tours, public transportation is unavailable beyond a certain hour of the evening. Where public transportation is available, buses and subways run infrequently and are unsafe after dark. As a result, telephone companies provide taxi service for Traffic Department fe-

Often no public or company parking is available for these employees

Tax supported public transportation is not meeting needs in the cities

male employees on shifts ending in late evening or early morning hours. In some states businesses are required by law to provide this type of transportation for female employees. The Bell System is spending more than $5 million a year on cab service for telephone operators who work late shifts. This is separate from all other expenditures for taxis, for other reasons and other personnel. The amounts expended for operator cab service ranges from $46,000 a year at Indiana Bell to $800,000 a year in Southern Bell, according to a recent Traffic Department survey.

Five million dollars is a large amount even for an organization the size of the Bell System, and there are factors that could dramatically increase this cost. For example, if it became necessary to expand this service in response to increasing vandalism and crime and further deterioration in big-city transit service, say, by moving the cutoff hour for taxi service, which varies from 9 p.m. to midnight among the various telephone companies, costs could skyrocket. A study conducted by one Bell System company indicates that the cost of changing the cutoff hour from midnight to 10 p.m. in one East Coast city alone would raise annual taxi costs in that one city from $60,000 to $250,000 a year.

In addition to taxi service, some Bell System companies operate or subsidize bus transportation. For example, Ohio Bell in Cleveland, for security reasons, buses people from the rail and bus terminal to one of its offices between 6:15 and 7 a.m. and at night from dark to 11 p.m. After 11 p.m. taxi service is provided for operators. Operating the bus service costs the company $17,000 to $20,000 a year on top of the $8,000 to $10,000 a year the company now spends in Cleveland to provide nighttime taxi service for its operators.

Some would argue that for a corporation to provide this type of *ad hoc* transportation service is a superior alternative to the transportation available in many cities. And they would be right for the most part. But in many respects taxi service is unsatisfactory from the employee's standpoint. The refusal of many cab drivers to go into black communities, from which increasing numbers of big-city operators are drawn, is only one of the more obvious deficiencies of this mode of transportation.

Even on principal, however, such arrangements hardly can be considered a satisfactory solution to the problems associated with nighttime transportation. For the Bell System, like many other corporations, is a major taxpayer, contributing through its tax payments substantial sums toward the operating subsidies and capital expenditures for the transit systems in cities where it operates. And the fact that it must, in addition to tax payments, operate what are in effect special transport systems of its own to serve the needs of employees is a tragic waste of resources.

The Bell System is not alone. Numerous other businesses and institutions in our cities require safe, reliable transportation to move their people between home and job after dark. Among these are banks, insurance companies, data processing companies, printing establishments, industrial plants, hospitals, educational institutions, the Post Office and various other government departments. Some of these organizations, like the Bell System, have felt compelled to resort to special, nonpublic transportation arrangements.

What this tells us is that at certain times of the day and night the transportation needs of many of the nation's businesses, institutions and the people who work in or patronize these organizations are not being met adequately by the public transportation facilities they help to support through taxes. This is happening even though many municipalities have at their disposal a variety of transportation resources which, except for a few hours a day, are grossly underutilized—again, a pitiful waste of taxpayer resources.

Such waste could be greatly reduced – if not eliminated – if the cities with their transportation resources and corporations and other institutions with their transportation needs could develop cooperative arrangements for more efficient use of transportation facilities.

The problem of nighttime transportation deserves special consideration from transportation planners

as a problem the solution to which will require not only wider application of new transportation concepts such as those embodied in demand-activated bus systems but, more importantly, new concepts of cooperation among communities, businesses, institutions and transportation administrations. The solution demands a recognition that work patterns and life styles change, and that the vital activities carried on during hours of darkness require that the people who perform these functions receive the same transportation considerations as those who labor during the day.

In surveying the impact of transportation on Bell System employees in selected cities, it was found that the inadequacy or absence of accessible, reliable, economical, safe mass transportation, particularly in the inner city area of major cities, is subjecting Bell System people to inconvenience, rising financial costs and increasing threats to their personal safety. The result is that many people are abandoning mass transit as a mode of travel to and from work. They are becoming increasingly inclined toward and dependent upon the automobile, with its many inefficiencies and its negative impacts upon the environment.

Because mass transit is unavailable, unsatisfactory or uneconomical, the System finds itself, as an employer, under pressure from community residents, from zoning boards and from employees to provide parking for those who drive to work. But provision of parking is costly, environmentally damaging and wasteful and, in urban areas, often impossible.

The growing dependence on the automobile perpetuates a cycle in which more driving is encouraged, valuable land is devoted to roadways and parking, and more jobs are moved beyond the reach of the poor, the elderly and the minorities who are left behind in the city. In short, because of the inadequacies of the nation's mass transportation system, the Bell System and other large corporations are put into the position of subsidizing in a variety of ways the most inefficient mode of travel known to man—the automobile. At one suburban Bell location the amount of this subsidy is estimated to be about $1 million a year,

which is the roughly calculated value of the parking facilities, traffic controls, security and other services provided for employees who drive to work. On the other hand, for those who travel by rail, bus or auto to locations in urban areas, Bell System companies are under pressure to help defray rising costs associated with commutation.

An important part of the recent contract settlement with the Communications Workers of America, which is the union representing most Bell System employees, was a salary differential to help employees defray the added expense of working in major cities like New York, Detroit and Chicago. Transportation is one of the many costs these salary differentials–ranging up to $9 a week–are designed to help defray.

For many years the System has felt compelled to take account of transportation as a cost-of-living factor in computing the salaries paid to personnel transferred from one region of the country or from one city to another.

Even so, it has become increasingly difficult to encourage job transfers into the major cities. One of the reasons for this difficulty is the hardships and high costs commutation imposes upon employees coming from locations where previously they have been accustomed to a short ride to and from work each day. The deficiencies associated with the present system of mass transportation have become an important factor in the expense and the inconvenience associated with maintaining a viable business in the cities. If the present outward movement of corporations continues, these same deficiencies may become equally important as factors in maintaining a viable business in the suburbs.

The impact of inadequate transportation upon employees, and ultimately upon Bell System companies, is not unlike the experience of many urban-based corporations. Considering these impacts and their indirect costs alongside the direct costs incurred for transportation services and equipment, it seems clear that many corporations not directly a part of the transportation industry nevertheless have an immediate and identifiable stake in the development and implementation of intelligent transportation policy.

Corporations, including Bell System companies, within the constraints under which they function, and with unfailing concern for broader community interests such as housing, esthetics and culture, must foster informed involvement in the broader aspects of transportation and general community planning. And this involvement should be guided by the practical recognition that the construction of transportation facilities such as subway systems, roads, highways and traffic interchanges literally can change the face of a map in one sweep.

Without thoughtful planning, the result can be human misery, ugliness, pollution and congestion. What once seemed like an enduring business, residential or industrial site almost overnight can become unattractive for certain forms of business, recreational or land use. On the other hand, with sensitive and creative planning there is hope for preserving and enhancing the natural attributes of areas, opening up access to jobs, places of culture and learning, new housing and increasing land values, tax revenues and new markets.

The essential issue confronting the corporation is whether the power to effect such sweeping change —change that impacts heavily upon the corporate environment—is to be left to leading politicians, professional planners and the larger banks and real estate interests, all of whom have a sophisticated, well-defined interest in planning and an established presence in the planning process.

The choice seems clear. Corporations potentially have much to contribute to planning for transportation. They should make this contribution in their own interest, in the interest of a more disciplined, creative and democratic planning process, and in the interest of building a better world in which to work.

Without thoughtful planning, the result can be human misery, ugliness, pollution and congestion

---

Mr. Quick is an information manager in AT&T's Information Department Planning Division in New York. He is a graduate of Columbia University and has held various editorial and administrative public relations and employee information posts at Western Electric in New York and at Bell Telephone Laboratories in New Jersey.

Forecasting the Labor Force

In the next decade, Bell companies will interview 10 million people, will hire one million of them and will keep about 300,000. Who they'll be and where they'll come from are subjects of keen interest to today's manpower planners.

The Bell System, as the employer of more than a million people, today is especially constrained to know, as accurately as possible, where employees of the future can be found. The volatility of social events in this country, and changing concepts as to what is desirable work, suggest that there is a continuous risk—for companies large and small—of misgauging the *actual* labor force that will be available at any point in time.

The best insurance against that risk is to survey the market in any prospective new location at least enough to gauge the probability of hiring the people who will be needed. That is what AT&T did more than four years ago when it planned to move its computerized share owner record operation from Manhattan to the open country of central New Jersey. Country though it was, it was centrally located among highways and railroads and was well-populated. The same virtues which made the site a logical choice for AT&T had also made it attractive for other industries, such as American Standard, Colgate and Chanel. Accordingly, advance planners of AT&T's move surveyed 20 companies already in the area to help assess availability of labor in various categories. Although not scientifically accurate from a statistical point of view, the effort paid off. Even before the move was actually made some two years later, people had not only been hired locally but were being bussed in a kind of "reverse commute" to New York to learn the jobs they'd be doing when the new building opened in New Jersey.

AT&T has followed essentially the same procedure in planning the proposed move of some of its headquarters departments from city to country. While the new building destined for a 140-acre site in New Jersey was taking form on the architect's boards, the shape and composition of the local labor market was being studied. Now, AT&T's Administrative Services people are applying a new statistical method for labor market analysis which yields a more accurate picture of potential new employees. While this study is now being done after the site was chosen rather than before, it should provide valuable insight into labor availability and other data needed for further planning in the area.

The indispensability of such insight is apparent when one considers the fact that, during the decade of the seventies, the Bell companies across the country will construct about 1,600 new buildings to meet demands for service. Staffing those new facilities will call for about 300,000 new employees. The experience of the Bell System companies has been that, in round numbers, for every 100 people who seek work, only 10 are hired; and of those 10, just three are still there at the end of a year. In terms of the decade now beginning, Bell companies will interview about 10 mil-

lion people, to hire one million, to net 300,000. Just where those people will be found will be an important factor in just where those new buildings will be located.

The critical issue, of course, is the kind of forecasting which takes account of human realities. For more is involved in estimating a labor market than simply counting the local population or computing future growth. There are certain facts of life in this nation that should be pinned to any employer's wall at least for the next 10 years:

- There will be fewer teen-agers available than there were in the sixties, both in absolute numbers and as a percentage of the total population and the labor force.
- There will be more older, married women as opposed to the former prevalence of younger, single girls.
- There clearly will be more nonwhite people in most of the country's larger cities.
- Large industrial employers will depend heavily on labor drawn from the city rather than from people living in suburbs or small towns.

Big cities: economic lifeline

In the states that lie roughly in the triangle between Boston, Washington, D.C., and Chicago, hiring of the magnitude implied in future industrial growth means hiring in the cities. The largest cities in this nation are, and always have been, the economic lifeline of the Bell System. In fact, the System's main concern in the future will lie in the cities of about one million population or more. Historically, it has made good sense for a company to do business where most of its customers and workers were clustered together. Today, it still makes excellent economic sense.

The truth of the principle can be demonstrated in a sample of the same 2,300 urban centers in the United States. Considering only 30 of them—or less than 2 per cent—and excluding their suburban communities, we find that they supply about 36 per cent of all telephone company employees, represent 27 per cent of the System's investment in plant and provide nearly one-quarter of annual Bell System revenues. Those 30 cities encompass 262,000 employees, $13 billion in plant and $4 billion in revenue.

The importance of the city grows even larger when one looks more closely at just who works now for the Bell operating companies. Half of the nonmanagement force today is under 30 years of age. Women comprise 61 per cent of that force. In fact, women accounted for 60 per cent of the growth in the total labor force of the U.S. during the last decade, and that distaff increase was among women from 20 to 34 years old. Demographers say that this was due primarily to married women entering the labor market. While, for 30 years, the number of single women in the labor force has been relatively stable, the percentage of married women has about doubled and today accounts for two-thirds of the total female labor force.

Merely counting bodies in the population generally predicts very little about a labor market. Socio-cultural factors, such as age, sex, color and education are fully as important as numbers. Education, especially, is a necessary factor in any equation of available labor in this country today.

It would appear from population statistics that the United States is assured of a growing, expanding labor force. While this may be true generally, it is not necessarily true specifically for the Bell System, which for many years has drawn heavily for its entry employees from the *youth market*—that segment of the population under 25. And it is among this group that education is the greatest single factor affecting whether a young person will be in or out of the labor force.

Hang in, not drop out

During the sixties, Americans continued to seek as much education as they could get. There was great emphasis on completing high school and, as a result, high school graduates increased from 65 to 81 per cent of those entering. The steady increase in numbers of young people completing high school will slacken only a bit and, by 1975, 85 per cent of our youth will be graduates.

Just as more and more have been completing high school, more and more also have enrolled in college. In 1960, 3.6 million students were attending college. By 1970, 7.2 million were enrolled—an increase of 100 per cent.

A taste of college has impact

During the seventies, the drive for youth to seek advanced education will continue. That drive will take large numbers of young people out of a labor market that the Bell System has depended on each year as a primary recruiting source. By 1980, among Americans 25 years old and over, there will be 51 million high school graduates, 15 million with some college training, and 19 million with a college degree. The group of 15 million young people with some college experience will become more significant for any employer studying the characteristics of the labor markets of the seventies.

Less than half of all students who enroll in college graduate. For that reason—from the Bell System's point of view—the labor pool for jobs such as service representative and communications consultant should be a good one. It is less certain, however, what impact college experience will have on the people the System will need for other jobs such as operator, clerk and craftsman.

As a result of these constraints on the labor market, the supply of young workers will grow by only 4.9 million in the next 10 years, an increase of 27 per cent from the present. That is good growth, but it is by no means what it was in the sixties. If something happens to increase college enrollment levels still further, the youth labor market will shrink concomitantly.

Also, environment has an important bearing on the composition of that pool of young workers. While roughly two-thirds of suburban youngsters will go on to college after high school, in the largest cities less than half will go beyond high school, and will be seeking employment right after they walk off the school grounds for the last time. In Chicago, Illinois Bell recently verified the accuracy of that prediction. In seeking young people who would go to work fresh from high school, the company found that more than one-third of all it needed in that category were right there, in the central city of Chicago. In the suburbs immediately adjacent to Chicago, the company could find another one-quarter.

In short, the greater Chicago metropolitan area accounted for about 60 per cent of the high school graduates who would go to work after graduation. There seemed to be no significant difference in whether the company was looking for males or females, and it also seems likely, on present evidence, that the Illinois experience will be duplicated in many other metropolitan areas of the nation.

Colmis refines the process

Color, of course, is another aspect of the labor market which affects labor supply. There was, in the sixties, a large-scale immigration of black people to the industrial cities of the country from the rural South, with the result that, in our largest cities, from 25 to 50 per cent, and more, of the labor force is nonwhite. There has been some migration of the nonwhite upper- and middle-economic groups from city into suburb, but, in the whole context of demography, such movement is only a trickle. It is even less than a trickle in the economic strata from which Bell companies ordinarily hire for many of their available jobs. Bell System employment data reflect both the massive nonwhite immigration into the cities and the extent to which the Bell companies have honored their pledges of equal opportunity of employment. Today, about 11 per cent of the work force in the nation is nonwhite; about 12 per cent of all Bell employees are nonwhite. Given the System's heavy reliance on the cities' labor market, it is reasonable to predict that even more Bell employees will be nonwhite in the future.

A general description of who will probably join the Bell System in the years ahead is not precise enough for a company which is considering a large outlay of money for a building in a new location. What is needed is a careful, factual forecast of the labor market, present and future, in areas of interest to the company. Happily, such estimation is a sensible subject for forecasting.

In the first place, all of the labor force for at least the next 15 years is living, freeing forecasters from concern about periodic variations in the birth rate. Secondly, there is surprising stability in about 80 per cent of the labor force, in the sense that most people tend to work in the same general locale all their lives. Thirdly, social changes affecting the labor force take place rather gradually, and are argued in the public domain over long periods of time, making it possible to "track" and measure those changes.

From these points, it is clear that any intelligent estimate of the labor market must invoke environmental factors and their resulting cultural changes. Most important for Bell System purposes, any study of the market has to be closely allied to telephone company problems and practices if it is to be useful at all.

With this in mind, AT&T last year enlisted Dr. Hugh Folk, professor of economics and labor at the University of Illinois, to develop a statistical model for labor estimation, in consultation with sociologists, demographers and other social scientists. The result of this project has been embodied in a statistical tool called Colmis, an acronym for Community Labor Market Information System.

Colmis essentially is a systematic method for examining a company's work force, present and potential. It is the first uniform and formalized system of labor force analysis ever developed for the Bell companies. How useful its data will be depends on who participates in its application. Experience to date strongly suggests that operations managers, planners, statisticians and personnel people – possibly others–should be included in the task force applying the system.

The flexible model

Briefly, the procedure Colmis recommends is a three-step analysis. First, a "new hire sample," which is an analysis of the characteristics (age, sex, family income, parenthood, education, etc.) of employees who have been hired recently for specific telephone company positions, such as operator, lineman, service representative, clerk. Second, a "non-hire sample," which is a similar study of those who sought telephone employment but were not hired. Third, a comparison of the inside analysis with the market analysis to determine the structure of the labor force in the new area. Use of the model so far implies high probabilities that Bell companies will attract people similar to those who already work for them. Should the analysis of the community disclose an unlikely labor market in terms of present employees, the model permits adjustments to utilize the labor that is available.

Work as human fulfillment

For example, if the employees in a specific job are female and mostly under age 35, a company might find in its market estimation a short supply of similar people–but a much larger supply if it raised its age preferences to 45. The model will forecast the labor market and tell managers what revisions in their thinking are called for to accommodate the facts of life.

Illinois Bell supplied data essential to development of Colmis, so that it would be geared to realities of the telephone business. Bell companies have, for many years, conducted studies aimed at labor market estimation. What the Colmis method does, in fact, is to refine older procedures so that sociological and cultural conditions can be taken usefully into account.

To date, Colmis–in part or all–has been used by several of the companies. They include, in addition to Illinois Bell, Northwestern, Indiana, Pennsylvania, Mountain, Long Lines, South Central and AT&T Administrative Services.

Beyond sophisticated statistical guidance, however, Colmis does imply a philosophy: One scientist has called it *the human use of human beings*. The Bell System's goal is to find people who will work well for telephone companies and to encourage them to experience that work as human fulfillment. Knowing where and how to find those people at the outset should help managers to realize that goal. ▪

‘We’re not trying to be unique; we’re just trying to operate’

In this day when consumers call the nation’s purveyors of goods and services to account, and when telephone customers tell the Bell System that things aren’t as they should be, service in the nation’s capital has never been better.

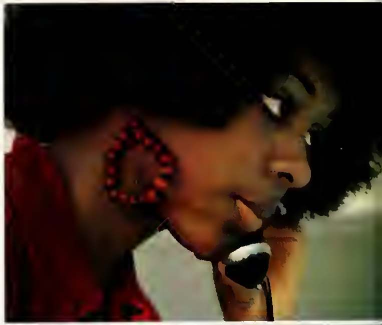
At a time when big-city environmental pressures, high customer expectations and general social unrest are taking their toll of people, operators in the District of Columbia seem a reasonably happy group.

“It’s simply a question of service standards and of managing people,” says Wade Rothgeb, general traffic manager of C&P Telephone in Washington. “We have no magic formula or book.

“When I first came into this job, results were fairly good. But then in the early 60’s we began having service trouble. One summer, I remember, we had our most difficult time, and then we decided we couldn’t accept the old excuses any more. The problem wasn’t going to go away. We simply had to manage the job, and we had to recognize that there was no room for prejudice . . . at all.”

At that time, C&P, like other companies, was entering a new period with a new employment market and new sources of manpower. “We had signed a piece of paper saying we were an Equal Opportunity Employer. We intended to implement the spirit of that as well as the letter.”

Fulfilling that charge meant learning to see and understand the viewpoint of new people coming into the business—the black people, the disadvantaged, sometimes the disenchanted—and learning to be flexible enough to cope with different backgrounds and disciplines. Many young black high school graduates have never had to achieve. When they go to work for the tele-



The Operators

phone company, it is often the first time they have ever been asked to meet high standards of any sort. Many come from an environment where they have never heard a polite word spoken. The idea of simple courtesy, especially to a faceless voice on the phone, may be as foreign as Sanskrit.

The labor market Washington draws upon encompasses an area that reaches far outside Washington itself. About 50 per cent of the operators hired there are not native to the area. They come mostly from the deep South. Three out of four operators are black. Rothgeb comments: "I think an all-black force would be as regrettable as an all-white force, but what we have simply is a sample of the balance of the population in the local labor market."

The District of Columbia traffic offices rank high in Bell System results in terms of measured traffic items such as board load, toll and assistance index, and directory assistance index. Washington traffic also has maintained one of the lower resignation and dismissal rates among the larger cities.

Results like these are in direct contradiction to what some might have expected way back in the 1950's when Washington's complexion was changing. By 1960, nonwhite operators were 6 per cent of the average force. In 1971, they comprised about 80 per cent.

Their performance record–that numerical distillation of results which guides the traffic supervisor in assessing the quality of service–speaks for itself. In 1960, the Washington, D.C. board load on an average business day was 93 per cent of the Bell System average. Through the first four months of 1971, it was 100 per cent.

In 1960-61, the directory assistance service index for Washington, D.C., was 96. Today it stands at 98. The toll service index has gone from 94 to 97. And the total absence rate has improved from 5.8 per cent in the 1954-56 period to 4.9 per cent in 1970.

Although most of these people do not come from "middle class" families, and some are still reacting to anything Establishment or white, C&P has found that its new work force reacts positively to people-oriented leadership. Although it may sound like a truism, a commitment to the principles of common humanity starts at the top and is supported all the way down the line.

Division Traffic Manager Robert Morgan emphasizes the point. "The biggest changes we've made in the last few years are in dealing with people. We try to make them feel more a part of the company. We put more weight on the quality of supervision after we get them, to help them understand why they're doing what they're doing. We have good people in Washington–as good as anywhere."

Mary Roberts, a former chief operator who is black and has been promoted to supervisor on the Personnel staff, puts it this way: "We all look alike; we've become educated in working together. Our employees are not treated any differently because they happen to be black. There is a mutual respect between management and nonmanagement. We don't think in terms of color lines or differences. We just think positive. We proceed with assurance it will work."

Getting employees, of course, is a vital part of the process. Applicants come into the employment office both through reference from present employees and right off the street. But over many years, C&P Telephone has had a good high school recruiting program. Young recruiters make about 16,000 individual contacts each year, going into the schools, telling prospective employees about the telephone company jobs and careers. Young central office people who have earned responsibility – service assistants, for example – very near the ages of the people they're talking to, spend an hour or so telling their own success stories, giving living testimony to the advantages of a job with the telephone company. Tours for students are conducted through central offices, "so they can see at first hand what we're talking about," says Morgan. "But we tell it like it is, including odd hours, split shifts and other potentially negative aspects of the traffic job. We don't overdo the negative, but simply try to be as realistic as possible."

Indeed, says district traffic manager Ed Crump, "Believability is the greatest factor in our successful hiring. The community knows that we mean what we say. The schools know we exist; they call on us. Our external communications line is quite good."

It is axiomatic that internal communication is good, too. It is intensive, personal, continuous and genuine. It can perhaps be summed up in one of the guiding principles that C&P management has used in working with the operators: *asking, caring, participating.*

Supervisors, from service assistants to chief operators, always are available for guidance and counseling. And it is in the interest of this availability that the ratio of supervisors to operators has been increased. Formerly there were 30 to 35 operators to each group chief operator. Now, there are only from 20 to 25.

But it is the human contacts, not the numbers, that are important. It begins for most employees in centralized training, where there is time for personal attention. Problems the new operator brings with her—problems implicit in her life experience—can be identified almost immediately and helped. The trainees are there with others, all alike, all in the same boat, doing the same things at the same time, facing the new experience together. There, the trainee has an opportunity to learn without inhibitions.

When initial training is completed, the personal attention continues on the actual job.

As district traffic manager Ed Crump says: "You can't expect new employees to come directly from training and start in cold to operate. We've developed a continuation of the personal contact and supportive atmosphere they have been led to expect in training. The service assistant takes the new operators under her wing, gets to know them, sees what they need. The immediate supervisor takes them to lunch. New people are shown around and introduced to their future co-workers by other operators already on the job. They talk with the chief operator. Right then and there, we start to set standards for them."

Since maintaining standards of service is at the core of traffic's job, this is the critically important beginning of a continuing process. "It takes a lot more skill to get the results we aim for with the people we get," Rothgeb comments. "We've had to lay aside old disciplines, some of the old hard-and-fast rules. We've had to learn where and how much to bend. But relaxing some of the rules doesn't mean being soft.

"We haven't compromised our standards. If we set positive objectives, and the new operators know they have to reach them, they will. We challenge them by requiring performance—the same high quality performance by everybody."

Performance includes perfect attendance—perfect, at least, within the limits of human possibility. And the concept of perfect attendance has bothered some of the new employees as they first saw it. "If you really were sick," said one, "you ought to be out with a clear conscience." Another nearly left the company after about six months, but counseling with her Group Chief Operator helped keep her on the job. And, at the end of a year of perfect attendance, she received—as do all the girls—a gold bracelet with a bell-shaped charm.

"She realized she had achieved something worthwhile," says Rothgeb. "Just that much visible evidence of achievement was very important to her. It has proved to be important to all these girls. A simple device, perhaps, but a genuine incentive. As basic motivation, experience shows it helps do the job."

Under the Pep Program, based on attendance and performance, operators receive a gold pin after 15 months of a job well done, and are taken to lunch. Says one, "This makes you want to do your best."

The system may be reminiscent of the gold star pasted to a perfect spelling paper proudly borne home from school by a child who has done her best, but it works. And it works in an environment dominated by the ubiquitous offices of the Government.

Insist on good attendance

"Washington is primarily a government town," says Lloyd Dyer, Vice President, Personnel for C&P. "There are somewhat different standards of attendance among government and civil service employees—different, that is, from what we must have to maintain service. Those people can accumulate sick leave, in addition to their regular vacation time at the rate of 13 days a year, and can continue this over the years, adding to their 'bank' of sick leave. Our employees know about these different standards of attendance prevailing in the city. But," Dyer adds, "you don't have good attendance unless you insist on it, awards notwithstanding."

There are other incentives to good performance in addition to the tangible evidence offered in the charm bracelets, gold pins and luncheon with the supervisor. For some time now, throughout the city new operators have been instructed to answer calls with the words "Student operator." This has helped relieve some of the tension and pressure inevitably felt by the new operators handling the first calls at the board, and helps them through the transition period while they gain experience and confidence. Soon—often in as little as one week—the Group Chief Operator, watching the new employee's performance, can advance a new operator out of the student class. This in itself has proved to be an incentive, a challenge to see how soon the new employees can "graduate" from saying "Student Operator" to answering simply "Directory Assistance," or any other appropriate response a regular operator makes.

Such a trial is symptomatic of new flexibility in administering central offices. "There is more permissiveness now in central office life," comments Jack Regan, Staff Supervisor, Traffic Personnel, "in such things as details of behavior at the switchboard. Only in the last few years we've dropped the old seating plan which required that operators sit in designated chairs and only there, and that they look neither right nor left."

What comes through clearly is the fact that young people today cannot be managed on the job as they were a few years ago. Concessions must be made to their prevailing determination to "do your own thing." Typical of such concessions—which might have shocked a traffic supervisor of the last generation and which still may disturb some—is a new liberalism allowed the operators in the matter of dress. No matter how they may appear when they first join the company, they soon accept new standards of dress—and these standards are freer than they might have expected.

Wade Rothgeb says: "It is remarkable in view of the environment from which many of our people come that their appearance changes after only a week or two of training. Not long ago they asked if they could wear pants suits. My reaction was, 'Why not? We didn't flap over miniskirts.' "

Whatever the operators wear has to be in good taste, however: no jeans or stretch pants are allowed. There have been some cases where the Group Chief Operator has had to counsel with a girl in the interest of good taste. "But," Rothgeb emphasizes, "this is quite different from simply coming out and saying flatly, 'No, you may not.' "

Some central offices in the district have one day each month called

Do Your Own Thing Day, when operators may wear whatever they wish. But experience has shown that they don't abuse the privilege by deliberately wearing clothes they know wouldn't be advisable ordinarily. Clearly, they have developed pride in their appearance as telephone employees. They have, in fact, their own groups in the offices, called operator service committees, which constitute a kind of police force of their own. They themselves will police the service standards in their office, or the appearance of the office–including dress–if, in their joint opinion, either declines.

Among other innovations now on trial is a "guaranteed hours" offering in one office, instituted with the full cooperation of the union representing the operators. The company has tried to assign working hours on the basis of first, second and third choices on the part of the operators themselves. The new offering guarantees that they can continue working on their chosen hours without being asked to change. Further, a girl can move to a day-only office from an office operating 24 hours daily if necessary for significant personal reasons. Also, an operator can be moved to Intercept, for example, if she doesn't work out well in another type of service such as Directory Assistance; the problem may be simply one of differing skills or affinity for a different kind of work.

The record at C&P shows that operators have mobility in their jobs, not only laterally but upward in the company as well. Thirty-seven of the 90 group chief operators are black.

Moved up faster

Most of these have been appointed within the last five years. "And," says Rothgeb, "they have moved up faster than white operators did 10 years ago." He is sure that several of the present black group chiefs will become chief operators.

More than half of all service assistants are black. Rothgeb says more of them might be, but he points out that operators turn down promotions to service assistants because of the difference in hours and because they would have to start all over again as it were, at the bottom of another group. "Nevertheless, they know the opportunity is there," Rothgeb says.

In addition to the regular employment channels, there is the Urban Hiring Program, under which almost 300 people who failed to meet normal hiring standards have been hired by the company since February 1968. Of these, 70 per cent have made the grade, with special coaching and training, and are now permanent employees.

"Additional training is necessary to achieve success with the new labor force," says Crump. "Training sometimes takes four to five times the normal period. But it has been worth it, and our hats are off to the supervision in the central offices for all the hard work they've done to help these people become full-time employees, contributing their share to the business."

One of these is Florence Harris, who joined the company almost two years ago under the Program and is now an operator in the Bellcrest Directory Assistance Office. Recently she was asked to speak to a group of new employees just starting, and her candid comments testify to the success of the Program at the C&P Company in helping the disadvantaged to find useful employment.

"My biggest Christmas present came," she said, "when they made me permanent.

"I had trouble in training, especially with my vocabulary, because I didn't finish high school. But my supervisor helped me to make it up." (Florence's supervisor and her husband devised a home-study plan for her.) "As a result of their help, I speak better than I ever could have otherwise. I'm not afraid to answer calls as I would have been.

"The company is just like the hospital–we have to give the service. That's what we're being paid for. It's a pleasure to give the service.

"We get along well in the office. There are no conflicts, everyone helps each other. Our supervisor is a very great help. She'll try to get anything we ask for. The supervisors and Group Chief Operators sit down with you and communicate. We talk about our problems we face on the job.

"I plan to go back to school for clerical work. I'd like to do clerical work someday for the company."

When asked, "How do you deal with people who are nasty to you on the phone?" Florence replied: "Just be nice yourself, no matter what they say. If you get one that's real nasty and you're nice to him, you back him down, and when he hangs up he may even offer a thank you.

"When we black people get the opportunity for a good job, we sometimes still have a chip on our shoulder. But here, we don't know what color we are in the office."

"You'll make it"

Her parting advice can be applied universally. "I was nervous at first and didn't know whether I'd make it, but I was determined to try. You have to really want the job and to work for the telephone company. I really wanted the job *myself*, and if you want the job enough, if you really want to help yourself, you'll make it."

The success of C&P Washington in building an excellent operating traffic force from today's available labor is due to an accretion of many things: flexibility in applying the rules, the willingness to take a chance in experimenting with something new, the ability to see and understand points of view that a short time ago would have seemed almost alien. Chief Operator Mary Roberts says: "Youth today is so much different from what it was only a few years ago. When I was their age, we weren't nearly as involved in the world as it is. Now, they are involved, and we must be involved with them."

Above all, perhaps, is the determination to treat this important segment of humanity not as black people or white people, but simply as *people*.

Wade Rothgeb comments: "We simply are trying to do what seems to be good management, without knowing whether or not it's really unique in the Bell System. We're not trying to be unique; we're just trying to operate."

Unique or not, the human approach to managing people works in Washington.

–By Donald R. Woodford, Managing Editor of Bell Telephone Magazine.

The New Loyalty “Ma Bell is a Cheap Mothe
This message appeared on T-shirts, bump
stickers and decals during recent lab
negotiations. ■ Young Americans are crossin
the Canadian border at the rate of 50
week. Newsweek in a special report est
mated there are probably 50,000 t
70,000 seeking refuge there, strung o
from Vancouver to Halifax. Over 89,00
deserted from the armed services of th
United States in 1970—and an ever larg
number of young men dodged the dra
according to the Newsweek article. ■ Th
Wall Street Journal reported in April 1971 th
over 50 per cent of the men and 80 pe
cent of the women of 30,000 surveyed in
national College Placement Council stud
left their first employer within three yea

by John R. Bonée

What has happened to our neat little world?

Loyalty to one's country used to be a cardinal American virtue. Tens of thousands of young people now think so little of their native land that they are renouncing their citizenship and looking for what they believe is a better life elsewhere.

An employer can no longer count on his people to identify their interests with the interests of the company. He never knows when they will pack up and leave, to offer their services to another company, even a competitor.

Superficially, these phenomena bespeak an erosion of the old-fashioned virtue of loyalty.

To the typical middle-aged industrial manager, our society today seems to be in one big mess. But the younger people who do the job-hopping and the border-crossing defend themselves in eloquent terms. What the Establishment sees as disloyalty, they see as idealism. What the System views as treason, they interpret as integrity. "We're not disloyal," they say. "We're more deeply loyal than you ever dreamed of being. We're loyal to ourselves, to our own self-fulfillment and to more noble moral values than yours." They accuse the society they reject of crass materialism and hypocrisy. And they think of themselves as more authentically human. Is it honest to look for self-fulfillment? Or is that just another name for selfishness?

There is a great deal of disagreement about the answer.

One point of view is that the kind of people we're hiring today are changing their values. People coming into our companies just view their own individual needs and values above the needs and values of the people for whom they work.

George S. Odiorne, an acknowledged authority on management theory, sees young people today as rejecting the traditional idea that knowledge comes from experience and is passed on from the old to the young. They see knowledge as cumulative – succeeding generations starting where others left off. They refuse to climb to the top through the seniority system and demand that their bosses recognize and reward brains, ability and superior moral principles.

Behind all the puzzling phenomena of idealism, mobility and apparent disloyalty, we may find some fundamental differences between today's middle-aged managers and the younger generation. In most cases, older people–managers or craftsmen–already have realized their dreams, while younger people have not yet achieved theirs. The dreams of the older generation were born of depression and war. These are people who grew up deprived. They dreamed of a house and a car and a vacation, not much more. Any job seemed attractive to them. When they got a job with security, they were grateful, and their gratitude gave birth to loyalty. Young people today are more selective. They begin with the security that their parents saw as a goal, perhaps even an unattainable ideal.

The middle-aged businessman most disliked by the young is the pragmatist who excels in problem solving, says Odiorne. He isolates the problem and abstracts from whatever does not contribute to a solution. If the solution generates other problems, he'll deal with new problems as they come along. Today's young people are acutely aware of the limits of this kind of pragmatism. They are even scandalized by it, disturbed that it does not consider the unintended side effects of *ad hoc* solutions.

Certainly the inventors and producers of the automobile did not consciously decide to pollute the air of our cities. This was an unintended, undesired side effect. Where the older group in our society sees the marvelous benefits of modern transportation, younger people see the unintended and harmful consequences. And they hold their fathers responsible for not having foreseen and controlled these consequences.

How does this difference in orientation affect a person's loyalty to his employer? At first blush, it may seem that it brings about an erosion of every old-fashioned loyalty and replaces it, depending on your point of view, with either selfishness or idealism. Sometimes it's hard to decide whether people today are completely self-serving–

each demanding the right, and even the subsidy, to do his "own thing," or hopelessly idealistic—struggling for abstract, unattainable goals.

Need for fidelity

But nobody can be completely without loyalty, least of all the young. Psychoanalyst Erik Erikson has noted that one aspect of the process of identity formation is the need for fidelity. The human person passing from adolescence to adulthood feels an intense need to be true to something outside himself. It may be another person, an institution, an ideology, an ideal. But he must be loyal to someone or something. The problem is that people have trouble separating ideologies from their own inner needs. It's easy, unconsciously, to start from within, then externalize one's inner needs and feelings and make them the object of loyalty. This is why some people can paradoxically seem both idealistic and selfish. They can have an abstract ideal, which they confuse with their self-interest and private feelings.

So, people must be loyal. The only question is, "Loyal to what?" If we believe what we read in the papers, the "new loyalty" is not to home, to family, to country, or especially, to the Bell System or any other corporation. It is loyalty to self, to principle, to moral standards, to humanity, to authenticity, to self-identity, to a thousand ideals that seem strangely abstract, clothed in bizarre unfamiliarity.

One word you hear a lot today is *professionalism*. Here's the analysis of one specialist in management process: "There's another influencing factor I think we tend to overlook. Its professionalization. There are more and more young people coming out of schools that specialize. They have a particular skill. Their allegiance and their loyalty is to that profession or that skill. And they want to develop a career in that area. They are very likely to leave a company with a policy of extensive cross-training that dictates that an employee spend some time in every department for a broad exposure. Today's young people say: "To hell with that. I don't want more training. Why don't you use the talents I have?" This attitude, where it exists, is probably what makes today's employee seem less loyal than his counterpart of a generation ago. Loyalty is a feeling of attachment, an identification of one's own interest with the interest of another person or institution. What is happening, apparently, is that people are transferring their loyalty from their company to their profession. They can maintain this kind of professional loyalty while still moving from job to job, from employer to employer.

To the organization man this is disturbing. He has always been after security and stability. Not today's young American on the move. His father was upset by lack of security. He, on the other hand, becomes anxious not when he moves but when he stands still. Change is the outstanding fact of contemporary life, and people are beginning to embrace it rather than fear it. Mobility is no more than a corollary of change.

"Uncritical" loyalty

Right or wrong, the popular conception of old-fashioned loyalty is that it tended to be uncritical, never rocking the boat. Defenders of the new loyalty staunchly maintain that self-criticism, criticism of one's company, one's family or one's country, is deeper and more desirable. A typical young person in today's business world might well say: " I think if I disagree, *I'm being disloyal* if I don't make my disagreement known. To be loyal I almost have to be two-faced. On the outside, when I hear criticism of my company, I try to put the best face on the situation. On the inside I think I have to put the *worst* face on it to be loyal. Because unless we change bad situations, things are going to get worse, and the company is going to suffer. What I do has to be productive, and sometimes disagreement and criticism—even severe criticism—is the best kind of company loyalty."

This is a fairly sophisticated attitude and is rarely found together with intense personal identification. Identity with one's family, for example, may not inhibit constructive criticism. It is not common for a person's sense of integrity to be so strong as to make him resign from his own family. Yet people do leave home—and with increasing frequency today. The reason? Usually it boils down to a search, real or imagined, for individuality. Practically everyone today has a heightened sense of his own uniqueness and wants others to respect it.

Feel less proprietorship

A comparatively young and recent Bell System employee put it this way: "Years ago it was easier to identify with the telephone company on a personal level...it wasn't such a technocracy. You had a greater sense of proprietorship in your own little office than you do now. You were in your own little department that you were developing and making grow. I think now the technical aspect of business has grown so big that the sense of proprietorship has decreased." Perhaps there's something to this.

Professors of management theory talk a great deal about flexibility. A personnel manager said flexibility of judgment means that "It's O.K. to make a mistake." And she added, of her own company: "And I don't know that I have ever been in a place where it was so un-O.K. to make a mistake. You can get away with doing nothing, but you can't get away with making a mistake."

Nowadays, of course, we've all read Herzberg, and we know all about "Work Itself." But is it working? Old habits die hard. By the time dynamic new management theory filters down and is applied by the first-line supervisor, it easily can be reduced to a formula—and a fomula is no more than a blueprint for a machine.

Not long ago there was a convention—no, a *workshop*—of professional educators. They spent an entire week together in a *live-in* meeting, broken into small groups that stayed together throughout the program. The 9 a.m.-to-9 p.m. agenda consisted of discussions, role playing, group dynamics, all sorts of interaction. A clinical psychologist, there in the capacity of consultant, mused that "They're trying to institutionalize spontaneity."

This sort of situation can develop in application of management theory. When it does, "flexibility with judgment," "Work Itself," "the motivators"—everything—can become mere words. And when they do, people manage other people in the same muscular way they always did.

A case in point: A middle-aged married woman with five children helps make ends meet by working part-time for the telephone company in her community. She lives close enough to the central office to walk to work, where she is a Directory Assistance operator during the night hours.

A crashing mistake

At two in the morning a customer came home from a business trip and opened his mail. His telephone bill was there, and it amounted to $350. It was, of course, a crashing mistake. But what man could go to bed at two in the morning without some assurance that it *was* a mistake? The only available people at the telephone company he was sure were awake and on the job were the operators. He called Directory Assistance. Now, at two in the morning the operator certainly could not direct the customer to a service rep. And it would have been inhumane to ask him to wait until business hours. So she decided she'd talk to the man. She assured him it was probably a mistake, told him not to worry and that it would be all straightened out in the morning. No, he wouldn't have to pay $350 if he was mistakenly billed. Well, the supervisor heard her and came over and pulled out the jack. The helpful operator got chewed out, but good. She's not allowed to engage in conversations with customers. And she has no business discussing a bill, because she isn't a service rep—she doesn't work in the business office.

The supervisor was following her interpretation of accepted Bell System practices while the operator was following *her* concept of the Bell System's Spirit of Service. While this is an oversimplified translation of the tension between the old and the new loyalty, the question remains: Is it better to do what has always been done, or to bend the rules now and then? To a large extent, the traditional way of operating is ritualistic. Everybody, by scrupulously observing the rubrics, turns his job into a sort of religious ceremony.

Who's who symbols

There are rules to cover everything and status symbols to keep everybody aware of who's who. This one has a desk out on the floor, that one a cubicle. Manager 1 has X square feet of floor space, Manager 2 has X plus 20—because he's a level higher in the hierarchy. One person's desk has a plastic water bottle with paper cups; another has a stainless steel thermos and a set of real glasses!

Then, there are the ceremonies. The *coffee and* to celebrate anniversaries and retirements . . . luncheons, carefully controlled as to attendance, depending on who, why and how long . . . teas to celebrate good attendance in a particular office . . . local company bowling leagues. All this ritual and participation gives people a sense of identity, a feeling of cohesiveness. And it builds "loyalty."

But a great many of the new breed are impervious to what they consider hierarchical game playing. They accuse the traditional style of being phony and hypocritical.

Loud, dissenting voice

So, there it is. Old-timers were bred in deprivation and were grateful to the company that gave them a job—and they are loyal. They are more materialistic, more interested in money, in both the luxuries and necessities of life, because they had to struggle so hard for what they eventually got. The NOW generation starts where Mom and Dad left off. They have the necessities, so they can afford not to be worried about material things. They have higher ideals than their predecessors. They can afford to be mobile. As Alvin Toffler says in his book, *Future Shock*: "Men are willing to risk failure because they cannot believe they ever will starve."

But there is a loud, strong dissenting voice. There's a voice that says: "Human nature never

The author of this article is a prime example of the new loyalty of which he writes. He joined Illinois Bell in 1967 after having spent 25 years in the Dominican Order and 18 years as an ordained Roman Catholic priest.

"Naturally," he says, "I frequently get the question, 'Why did you do it?' My answer is, '*Because it was possible.*' What I mean is, it was possible to do this legally, within the framework of the institutional church. I didn't have to excommunicate myself in order to make the move. I'm still a Catholic in good standing and enjoy excellent rapport with my former colleagues in the Order.

"It was also possible from a *social* point of view. People are more accepting of this sort of transition than they used to be. I live in Oak Park, on Chicago's west side. I've preached in every pulpit in the area. Yet I have not lost a friend. I associate with the same people and am entertained, along with my wife, in the same homes that received me as Father Bonée. I think my own story says something about the climate of change and people's attitudes toward it."

changes." People are basically always the same; their differences are superficial. What are the necessities of life? Food . . . clothing . . . shelter . . . good working conditions.

What are good working conditions? What would have seemed comfortable to your grandfather would drive you right up the wall. Shelter? Is it a $75,000 split level with central air-conditioning and stables? Or is it a poncho that doesn't leak too much that you can pull over you on the grass? Our perception of what's basic changes from generation to generation.

No monopoly on hypocrisy

Ask an experienced recruiter for a large corporation whether young people today are fundamentally different. Chances are he'll admit they *articulate* their ideals differently from the way the job seeker did 10 or 20 years ago. They're more interested in action than in philosophy, perhaps. One of the most disquieting qualities of today's youth is their willingness (even eagerness) to put into practice the ideals their parents used to make speeches about. But if they are really interested in going to work, they are fundamentally the same sort of people we've been recruiting for decades.

What this means is simply that young people give us the answers they think we want to hear. Few young people today, questioned on the subject of stability, are going to say they expect to be with the same company 20 years from now. It's not what they learned back in business school. It's not a question of disloyalty. In fact, they believe they are being loyal to their teachers and loyal to ideals expressed in executive speeches when they profess a keen interest in mobility.

Let a recruiter go into a school and ask a student he's interviewing: "Tell me about a time you felt you did something good." The student will probably say: "Well, the Dean picked me to head up the committee on student discipline. I had 22 other kids with me and a big challenge and responsibility. We negotiated with the administration . . ." Of course, you never hear about that night on the beach with the beer and the babes. He knows that's not the answer he's expected to give. The older generation has no monopoly on hypocrisy.

Business and industry have convinced young people that they're looking for dynamic, self-starting, internally motivated people who can rise above and even control their environment. So, few are going to admit to wanting anything less than a job that is challenging, satisfying and offers a chance for self-development. And they'll say that if these conditions change or disappear, they'll move on. Because that's what they think they're expected to say. (And they may really believe it.) So it may not be that younger employees are not motivated by the material things of life. It may just be that they feel obliged to convince their bosses they're not motivated that way, that they're not security conscious. They don't want to appear to be playing it safe. It's a posture they assume or, if you wish, an image they want to create —of a dynamic, aggressive, hard-hitting, self-motivated person.

Even as these words are being printed, social conditions are changing. The recession, though perhaps abating, has taken its toll. In this case, it's taken its toll in terms of attitudes. The great cry is that people today are not interested in material things. They're more concerned about spiritual ideals. Perhaps. When basic needs are fulfilled, people start off at a different level when they set their goals. But start to threaten the fundamentals, and watch what happens. People will start dropping self-actualization and zip right around to worrying about food, clothing and shelter.

Fresh haircuts

The recruiters laugh. "Last year when I interviewed, everyone had hair down to his ankles. This year they all come in with fresh haircuts, because jobs are hard to get." The moral of this, we may suppose, is that it's dangerous to generalize about attitudes, especially the attitudes of youth. Youth is so ephemeral. It changes even faster than changing social conditions. And young people are not always as cynical as they like to think they are, not as inaccessible to personal influence as they pretend to be.

Here's a report from a personnel manager: "We had a young fellow with long hair who articulated all the latest ideas . . . 'I'm not going to sell my soul to the corporation . . . I'm my own man . . . I'm going to do my own thing.' . . . We put him to work in the Plant Department. We gave him a boss he really admired. And this boss was a caricature—hairy knuckles that scraped the ground when he walked, and every other word had four letters. The boss had a habit, a mannerism that showed up whenever he got ready to level with you. He'd lean back in his chair and hook his thumbs in his belt and cut loose. Well, about the second time I visited this modern, young, self-actualizing individual who wouldnt be controlled by anyone but himself, guess how he responded? When he got ready to level . . . back in the chair, thumbs in the belt . . . and he didn't even know he was doing it!"

Take your pick

The New Loyalty. What is it? There are many answers, and you can take your pick. All seem to have a certain validity.

The New Loyalty is not to persons or to institutions. It is rather to principles and ideals. It is fidelity to one's professional integrity. It is self-fulfillment, the refusal of the individual to be swallowed up in the mass, to become part of a machine. It is loyalty to the task rather than to the job, to standards rather than to the boss.

Perhaps it is all these and more. But perhaps, too, it is an age-old reality that now appears in new dress. It may be good old human nature, especially unchanging, speaking in a new language. Perhaps all we need is a good translator.

John R. Bonée is a Public Relations Supervisor for Illinois Bell. He attended Loyola University in New Orleans and holds two Master of Arts degrees from Aquinas Institute. He received a Ph.D. from the University of Fribourg in Switzerland. Dr. Bonée was professor of logic and contemporary philosophy at Aquinas Institute from 1953 to 1967 and taught at various other colleges in the Midwest for many years. He teaches mathematical logic and linguistic analysis at De Paul University in Chicago.

Two Exceptional Men

Justin Murphy's retirement party was anything but a wake. Among the 200 friends there from New York Telephone, AT&T, Holy Cross and high school days, not one of them seemed very sad to see Jus go.

You say that's a pity? You think that after 42 years' service with the Bell System—virtually all of it in New York City, where he was born and grew up—someone might show some regret instead of acting like it was V.J. Day all over again? A man so prominent in civic activities, so well known for his role as newspaper and television spokesman for New York Tel on the service issue, you think his colleagues might at least weep a bit in their beer?

The fact of the matter is that Murphy didn't retreat when he retired; he just changed his commute. And his friends felt as jubilant as he did. Long a board member of the Brooklyn Institute, parent body of the famed Brooklyn Botanical Gardens, the Brooklyn Museum and other historical and cultural centers of that populous (2.6 million people) and spirited borough, Murphy started work the morning after his party as vice president-development of the organization.

It was altogether appropriate that Murphy land such an assignment. He is a man who seeks involvement and cares deeply about people and people problems. And he is a man who looks ahead. Murphy is the sort of fellow Henrik Ibsen may have had in mind when he said: "I hold that man is in the right who is most closely in league with the future." Approaching 65, Jus Murphy is looking to the future as keenly as ever, inventing new procedures to help solve perplexing new problems, working to make the future of Brooklyn's teeming citizenry brighter than it might have been had he merely retired.

Another Ibsen man with convincing Bell System credentials is Henry Dreyfuss, 67, whose work with symbols was the subject of an article in the last issue of this magazine. Dreyfuss is probably the world's best known industrial designer. He has been creating Bell System buildings and telephones for many years. So long and so well that in 1958 he was voted the first honorary member of the Jewett chapter of the Telephone Pioneers at Bell Laboratories. Dreyfuss, too, keeps looking ahead, launching new projects, hunting for ways to do and make things better.

Whereas Murphy concentrated his energy in New York City and especially in Brooklyn during his long and productive career, and continues that concentration in "retirement," Dreyfuss dispenses his creative counsel around the nation and, indeed, around the world. With clients on both coasts and in the Midwest, he leapfrogs from city to city, listening and criticizing, writing and advising, shaping and building. He also serves on such august panels as the board of trustees of Cal Tech, new home base for his friend and fellow futurist, John Pierce, lately of Bell Labs.

At an age when most successful men have already chosen to slack off, or have at least elected not to go around looking for new mountains to move, Murphy and Dreyfuss have in common an intense involvement in innovative activities. To complete the portrait, and the comparison, both are thoroughly successful family men with grown children whose own occupations range from jet pilot, to psychiatrist, to page-one correspondent for a top metropolitan daily.

There are many such people as Jus Murphy and Henry Dreyfuss in the active ranks of the Bell System across the country today. They come in all sizes, shapes, colors and ages. And they, too, are in league with the future. They are people who are moving mountains now, within the business, and who will undoubtedly continue to move them later, in other places, when their work here ends. Yet, many though they may be, they are still the exceptions. Most of us lack the ability, impetus, stamina or the will to keep looking for new worlds to beat, and then to go out and beat them, when a gentlemanly routine effort is all that is required to run a job.

So far, this business evidently has had sufficient exceptions to lead it from where it began to where it is. It appears, however, that the Bell System soon will be needing many more truly exceptional people. Distant and not so distant rumblings of new controls, new competition, new technology, and tradition-shattering new ways of operating the business warn that we must have many more people with innovative instincts, broader interests and better wind for a long and arduous run—people like Murphy and Dreyfuss, if you will—men and women in pursuit of the new, the different, the difficult.

"How glorious it is—and how painful—to be an exception," said the French writer De Musset. If that is the case, then we had best begin courting both glory and pain in greater quantity. The exception must become the rule here.

AT&T

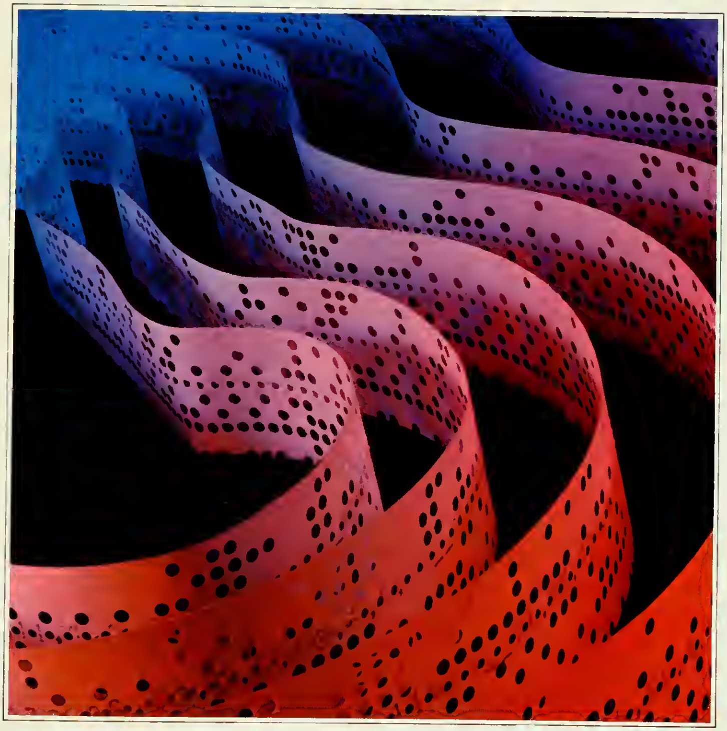
American Telephone and Telegraph Company
195 Broadway, New York, N.Y. 10007

Moving? Please inform the *BTM* circulation coordinator in your Bell Company's Public Relations Department. **Please include the mailing label from this issue.**

Printed in U.S.A.

Bell
TELEPHONE MAGAZINE

MARCH-APRIL 1972



A Lesson in Leadership

EDITORIAL

It is common throughout business and government and elsewhere to describe every period of leadership, no matter who the leader or what his merit, as the most crucial and constructive ever, even when it may not have been that by any stretch of a reasonable man's imagination. But no citizen in or out of the Bell System would deny that the late 1960's and the start of this new decade, into which H. I. Romnes has led the million members of this business, have set a precedent in the kinds and quantity of demands for change that have been made upon the country and upon this corporation. That the System continues on a steady course despite this storm of change can be ascribed in large measure to one man's steadying hand. For Bell System people serving this nation border to border, the Romnes years have provided a lesson in leadership.

One easily identifiable measure of such leadership, of course, is that the company Hi Romnes has led these last five years, and from which he retires as chairman, president and chief executive officer on March 31, closed 1971 with a financial performance that —despite a lagging economy— virtually matched the performance of its best year. Yet, there are other events and issues more characteristic of these times which, because of his cool handling of them must stand as the ultimate hallmark of the Romnes years, surpassing in significance the more immediate measure of the income statement.

Not often in business and industry has there been at the peak of a major institution a man so adept at anticipating, articulating and managing the human, technological, economic and environmental dimensions of change and its impact upon his organization. There are those, perhaps, who have hoped now and again that he might more often have publicly declared, firmly and without hesitation, "Damn the torpedoes . . . this is how it will be!" Some people will always feel more secure with a man at the helm who has—positively, instinctively and always—immediate answers to even the most complex issues. There is nothing irresponsible in such a style—except in times like these when intuition so often turns out to be an inadequate and sometimes treacherous guide.

The last 13 years, and especially the last five, since Hi Romnes has been chairman, have been anything and everything but simple. The churning and the changing that have molded the years since he became president of the Western Electric Company in March 1959 have in many ways made those years the most complicated in the life of this business. In these years we have been called upon not only to adjust to spectacular changes in technology and the changes in the structure of our industry they have set afoot, but also to a continuing ferment in the society around us—the mounting aspirations of minorities, the discontents of youth, the anti-war protests and the verbal and physical attacks on the so-called Establishment. It has been a singular era for all Bell System people—but, one suspects, especially for the retiring chairman.

(Continued on inside back cover)

Bell
TELEPHONE MAGAZINE

VOLUME 51 NUMBER 2 MARCH/APRIL 1972

2 **Bell System Plans in the Data Field**
By C. W. Owens
An in-depth look at the fastest-growing segment of the business.

6 **The Greatest of All Quests**
By Manfred Brotherton
BELLCOMM, its mission accomplished when man walked on the moon, is being phased out.

11 **The Better To Serve**
By Marco Gilliam
Bell companies train more people in a given year than any other industrial or academic institution.

16 **A New Top Team for the Bell System**
Profiles of the four men who will guide the System in the challenging years ahead.

18 **The Politics of Creative Tension**
By Henry M. Boettinger
Ideas about how an organization might be made to run at top efficiency.

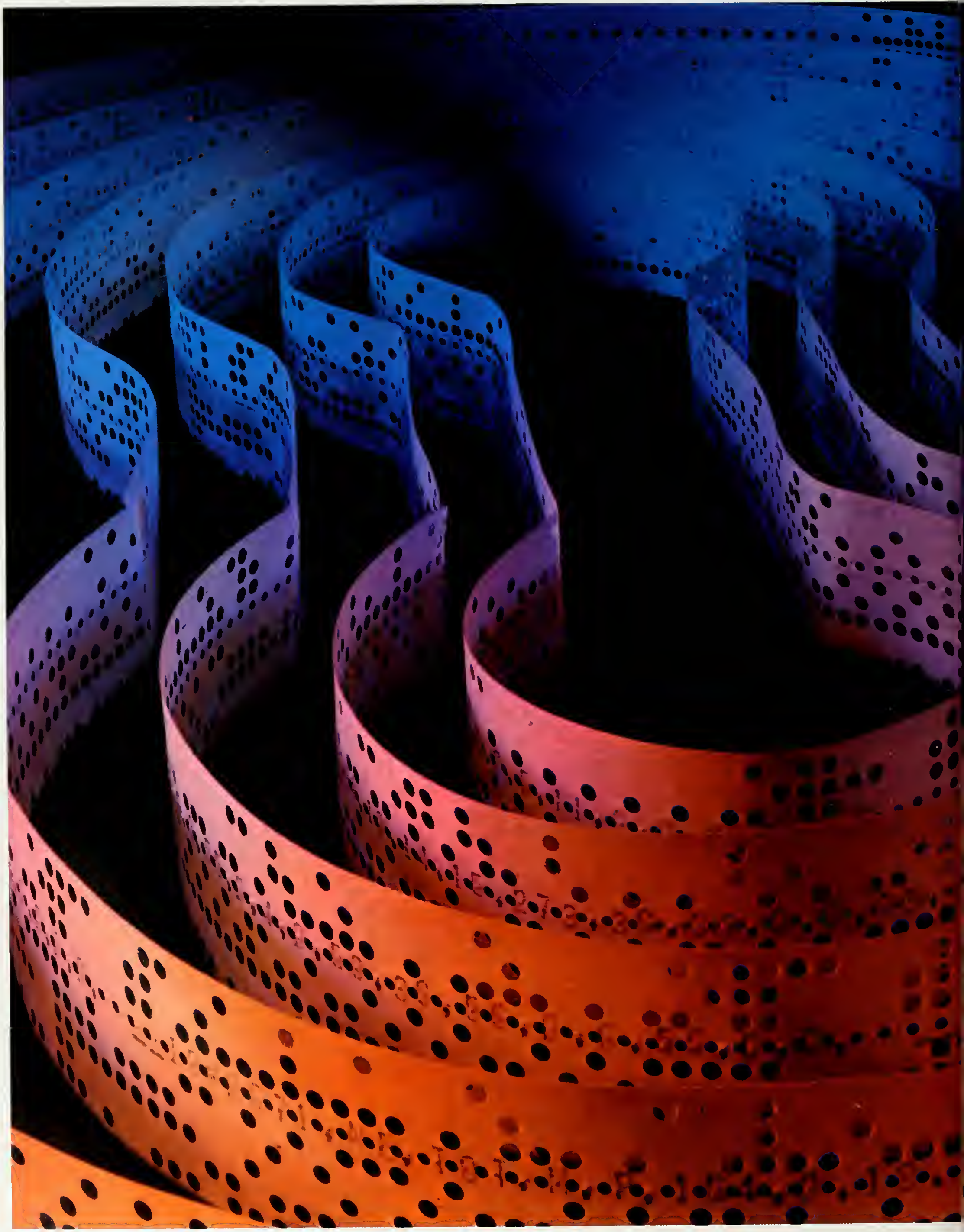
24 **Racism—Is It Alive and Well in America?**
Overt racism may be dying in the nation, but is a more insidious substitute taking its place?

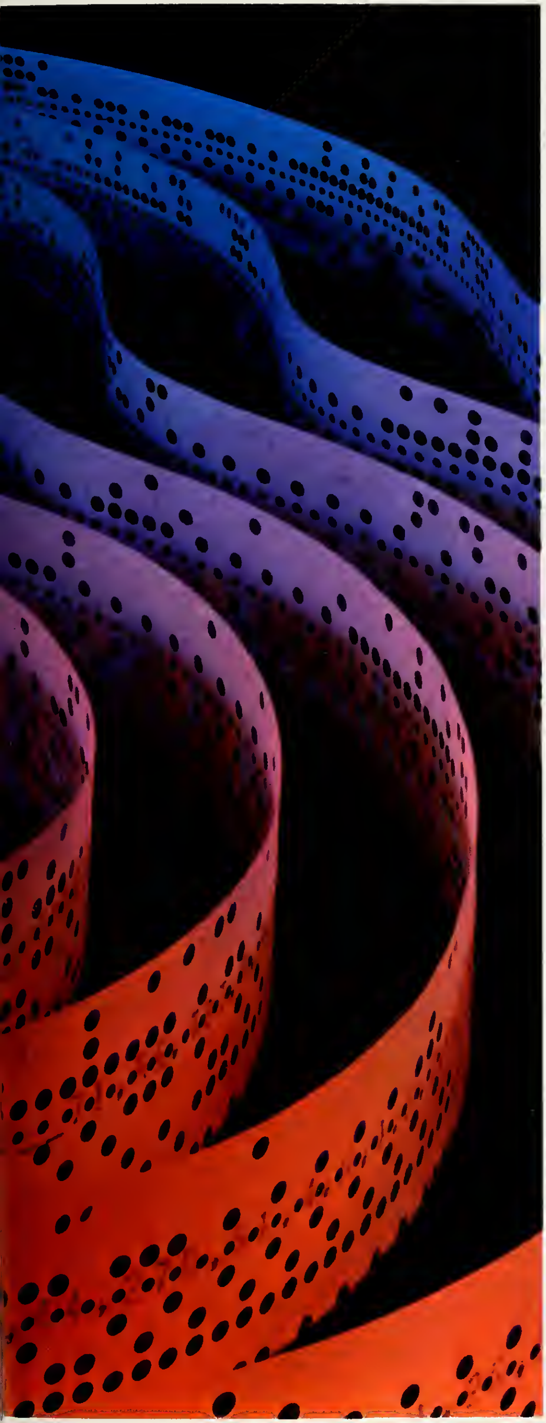
30 **A Warm Medium of Communication**
By Prof. Omar Khayyam Moore
Picturephone® service as an effective educational tool.

H. I. Romnes
Chairman of the Board and President
John D. deButts
Vice Chairman
Robert W. Ehrlich
Secretary
John J. Scanlon
Treasurer

Tim Henney
Editor
Al Catalano
Art Director
Donald R. Woodford
Managing Editor
Marco Gilliam
Associate Editor
Thomas J. Fay
Associate Editor
Robert L. Buchanan
Associate Editor

Published by
American Telephone
and Telegraph Company
195 Broadway,
New York, N.Y. 10007
212 393-8255





Bell System Plans in the Data Field

by C. W. Owens

Modern data communications date back to the mid-1950's, although the introduction of Data-Phone® data service in 1958 was greeted with a singular lack of interest. Most computer planners paid little attention to data transmission because they were busy justifying and optimizing their batch-oriented systems. However, good engineers seldom succumb to the hobgoblin of irrelevant consistency, and when second and third generation systems came on line in the 1960's, their designers were alert to the economies and flexibilities inherent in the conveniently arranged marriage of high-speed computers and communications facilities.

Government and the military were the first large-scale users of data communications, then more businesses began to take advantage of new techniques for handling and processing information and for administering its remote distribution and retrieval. By the beginning of this decade, data transmission had matured to the point that it represented the fastest growing segment of the communications business.

It's true that this growth has placed heavy demands on the Bell System, but the business has responded in good fashion. In just the past 10 years, for example, the Bell System has:

—Made available about 75 different types of Data-Phone data sets with some 20 speeds of operation.

—Offered three low-cost access arrangements to interconnect customer-owned data terminals with the nationwide switched network.

—Increased data speeds on the network. The direct dialed network will handle 4,800 bits per second, while private line voice grade channels will accommodate 10,800 bits a second. For customers who require ultrahigh-speed data transmission, the System can carry data at a variety of speeds up to 240,000 bits

For the network, there is no distinction between video, voice and binary bits

per second on wideband private line channels.

—Improved transmission performance. An error rate of better than one bit per million is characteristic of more than 50 per cent of data messages transmitted over the network at speeds up to 2,000 bits a second, and that takes in the vast majority of data messages.

Given that record of responsibilities, I am occasionally brought up short by two criticisms of the Bell System that appear to stem either from confusion or from the unrequited expectations of wishful optimists. One challenges the capability of the existing network to handle data, and the other concerns the size of the data market.

The usual litany about the switched network begins with the lament that it is a voice-oriented mechanism. It ends with the flat declaration that the Bell System has failed to recognize the importance of data communications.

I would be hard put to design a switched network for voice alone. When a large number of discrete channels is derived from a band of frequencies, the information transmitted over those channels can be voice, data or facsimile. The network makes no unique distinction between video signals, voice messages or bit streams. A customer who has data to transmit is indifferent to the means used to move the data. His preeminent concerns are that the data be faithfully reproduced with a minimum of error at a reasonable cost. A switched and private line network presently offering Bell System customers multiple options of transmitting data at speeds ranging from 45,000 to 240,000 bits per second is not voice-oriented, data-oriented, video-oriented or facsimile-oriented. It is simply communications-oriented.

What about the size of the data market? I have said that it is the fastest growing segment of Bell System business. It accounts for more than $500 million in annual revenue. During the past five years, the volume of data transmitted over the network has increased at a rate of 50 per cent a year. Even with the recent economic slowdown, it has been growing at about 35 per cent annually. Let me put the data portion of the business into perspective. We estimate that 3 to 5 per cent of transmission time on the network is devoted to data. By 1980 we believe this may quadruple, but the relative size of the data market —as opposed to its absolute size and importance—has been growing in measured increments rather than bounding leaps.

It is important to recognize that data transmission is not on the verge of overwhelming the ability of the Bell System to meet demands for a complete line of communications services. The nationwide network, as it exists today and as it develops in the future, has the capacity and the versatility to accommodate both the communications needs of the country and the requirements of specialized markets.

With that in mind, let me review the System's plans for expanding the network and improving its performance, particularly with respect to data transmission.

Digital systems are more economical than analog systems of comparable capacity for transmitting data, if there is enough data to transmit. But just as important, we recognize that many digital systems should be more economical for regular voice messages, particularly when they are used with the sort of large, electronic switching machines we expect to have operating in the next few years. Digital facilities already are well established in the network. For example, the System now has 13 million channel miles of digital lines in its short-haul plant. These digital voice channels are provided over a carrier system that operates at a bit rate exceeding 1.5 million bits per second. A companion system will be available this year. It will offer higher capacities—6,300,000 bits a second—over distances up to 500 miles. Higher capacity systems operating over longer distances also are under development.

Moreover, through use of newly designed analog-digital interface equipment, the Bell System can use the frequency space occupied by 600 voice channels on a coaxial cable to provide a digital transmission path carrying 13 million bits a second. Using similar techniques, the System can derive a digital ca-

An error rate of less than one bit in 10 million

pacity of 20 million bits per second from a single radio channel on many microwave systems now in operation.

Some of this new technology as well as existing facilities will be incorporated into the digital data system announced in 1970. This digital data system will be functionally discrete but physically integrated into the nationwide network. When AT&T first described plans for the digital network, the company said it should be in operation by late 1973 or early 1974 and would be serving 60 major metropolitan areas by the mid-seventies. Since then, the company has refined its estimates. The Bell System should be serving two dozen major metropolitan areas within a year of its "get-started" date, about 60 within two years, and about 100 within three to three and a half years.

That in itself is an exciting prospect. But AT&T is even more encouraged by a development nearing completion at Bell Laboratories. This development will provide the capability—on existing radio systems—of handling essentially all requirements for digital data service through 1977. What's especially exciting is that it will allow the System to provide a digital service at an exceptionally low incremental cost *without* displacing any channels on most of the network's radio relay systems. AT&T calls the development a "hitchhiking" system, because it rides on the lowest end of a radio channel. A more appropriate term is Data Under Voice (DUV).

The techniques involved permit the System to apply a digital bit stream under the analog or voice load carried by a radio channel, and for the most part this can be done without sacrificing any voice circuits. In a sense, the digital capability is an elegant by-product of the analog capability.

Basically, the DUV system is built around terminals that will process a digital signal of 1.5 million bits per second for transmission over analog microwave facilities. For every working radio channel on a microwave arrangement the System will get a digital stream of 1.5 million bits. So for a radio system that has 16 channels, the Bell System will be able to build in discrete steps from a capacity of 1.5 million bits per second to 25 million bits per second, depending on demand. The error rate on this system is impressive. Even when the working radio channel carrying the signal fades severely enough to trigger a switch to a protection channel, the error rate of the digital signal—at the time the switch is made—will still be significantly less than one bit for every 10 million bits transmitted. In the absence of fading, the performance of this system is expected to be so good that for all practical purposes the error rate will be zero. Since the Bell System's microwave system reaches into practically every corner of the country, this new development will permit rapid expansion of digital data services to almost every city of any size in the United States.

The Bell System has the human resources to match. Between 1961 and 1970 it operated a data school at Cooperstown, N.Y. Some 2,700 people were graduated from the school, 90 per cent of whom are still with the Bell System. In addition, the System has given data training to 8,000 communications consultants and to hundreds of other employees in the operating departments. It is continuing to do so. The Bell System has the people, the technology, the facilities—particularly the switched network—and the determination to serve the nation's data customers and serve them well. The System wants, intends and *will* do its utmost to assist their progress and success. That is not simply a valedictory promise. It is an expression of supreme self-enlightenment. The Bell System itself is second only to the Federal Government in the use of data communications systems and data processing equipment. In improving its capability to serve others, the System enhances its ability to manage its own business.

Louis Pasteur once remarked that chance favors the prepared mind. The System is preparing for a chance it is determined not to miss—the chance of serving the needs of data users to their *complete satisfaction*.

Mr. Owens is an executive vice president of AT&T and former president of New York Telephone Company.

The Greatest of All Quests

Behind-the-scenes aid from a little known Bell System company helped to put man on the moon. Now, with its mission completed, BELLCOMM phases out.

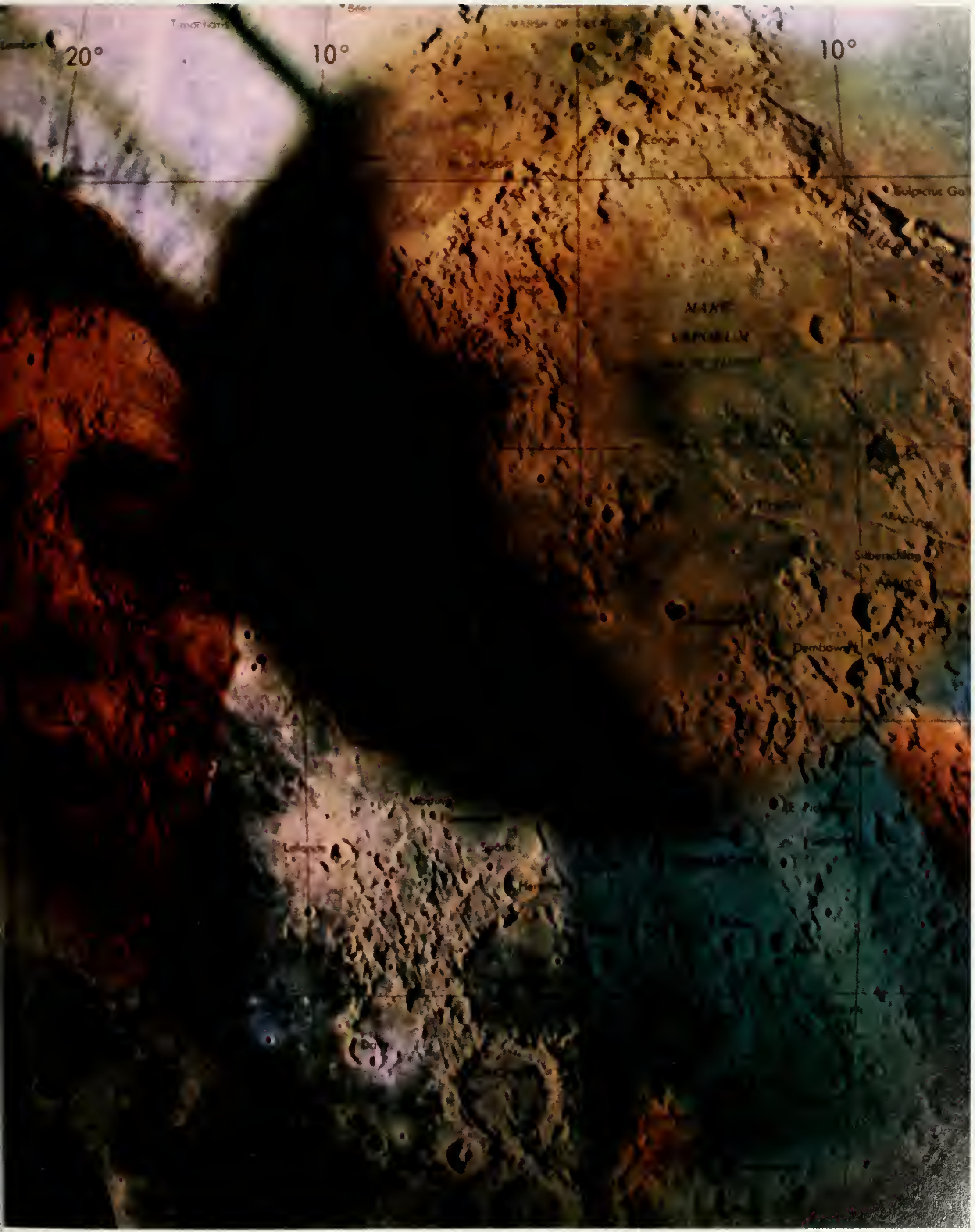
by Manfred Brotherton

In July 1969, for the first time in human history, man set foot on soil not of his native planet. As astronaut Neil H. Armstrong stepped from his lunar landing module into the dust of the moon's Sea of Tranquility, the world watched and heard his words. Even for a populace inured to technical marvels, this was a moment to remember differently from all other moments. And the fact that this moment, the culmination of the Apollo Mission, happened at all was due to American technology and manufacturing virtuosity. Among the immense team of people assembled to do the job was a contractor which, although little known to the public, played an important role in Apollo's success: a specially incorporated Bell System company called BELLCOMM.

A little over 60 years ago, when the Wright brothers proposed to build and fly a heavier-than-air machine, many wise men went on record saying it could not be done. When, in May 1961, President John F. Kennedy proposed that the United States put a man on the moon within the decade, the scientific and engineering community believed it probably *could* be done, because the basic technology and manufacturing capability were already available. To be sure, some pieces of essential information were missing: for example, detailed pictures of the lunar surface and knowledge of the best way to create a sufficiently reliable system from individual components which individually are fallible. But here again, most of the instrumentation through which such questions could be answered already existed, and what did not exist could be devised. There were really no insurmountable technical barriers to achieving the Apollo Mission as envisioned.

But it soon became apparent that there would be an organizational barrier—or, at least, an organizational challenge that would have to be met if the unprecedented complexities of the mission were to be drawn together into a manageable system. For NASA—the National Aeronautics and Space Administration—confronted a project. possibly unique in all of history in its need for the integration of so many diverse factors within such exacting constraints.

Briefly, the Apollo Mission would require a rocket powerful enough to lift a 50-ton payload into earth orbit, then send it on to the moon. The spacecraft it carried would have to provide food, water and oxygen, if not spacious comfort, for three men. These astronauts would need radio communications capable of sending and receiving telemetry signals, medical data, guidance signals, voice and TV pictures—all at once and without any mutual interference. Long before lift-off, NASA would have to pick optimum land-


20°
10°
0°
10°
Conon
Sulpicius Ga
MARE
VAPORUM
Silberschlag
Dembowski

ing sites on the moon, then, at the moment of truth, control a lunar vehicle to land exactly *there*. There would have to be on-board computers built into all spacecraft to control these complex and exacting maneuvers much faster than human reaction time could allow. And, finally, the space voyagers in their craft would have to be brought home to earth for a soft splashdown.

To accomplish the Apollo Mission, NASA created an organization of no less than 15,000 government people who were charged with the project, including management and procurement. In the industrial area there were hundreds of thousands of people divided among several prime contractors and thousands of subcontractors, as well as countless sub-subcontractors and vendors.

Systems engineering approach

As NASA officials and their advisers studied their assignment, they concluded that they would need help of a special kind and of a very high order of competence. James E. Webb, then NASA administrator, had the problem of harnessing a new art about which there was, even among the ablest men, much room for disagreement. He had those able men, but they had not yet worked together sufficiently to be considered a cohesive organization. Webb and his associates thought that there would have to be a vigorous and capable systems engineering function, operating at NASA headquarters in Washington. Webb discussed the problem with his special adviser, retired Bell Labs president Mervin J. Kelly, who was an enthusiastic advocate of the systems engineering approach.

In January 1962 Roswell Gilpatric, then Deputy Secretary of Defense, wrote to Frederick R. Kappel, then AT&T's Chairman of the Board. "The *systems engineering* of this complex mission," said Mr. Gilpatric, "is so vital that the effectiveness with which this work is performed can mean the difference between success or failure. . . . Mr. Webb, Mr. McNamara and I . . . are convinced that the American Telephone and Telegraph Company, through the Bell Telephone Laboratories, is outstanding in systems engineering capability and consequently is one of the very few companies in a position to perform a vital service to the country by assisting the National Aeronautics and Space Administration in this undertaking."

About a month later, Webb enlarged on Gilpatric's proposition in a letter to Kappel. He reiterated the fact that the Bell System could be of great help to NASA, and added: "The job of coordinating a worldwide communications network must have presented many of the same kinds of system planning, engineering and integration problems, on a very large scale, that we expect to encounter in carrying out the nation's program of manned space exploration." The Bell System, he went on, could provide "an organization of experienced men capable of giving the responsible NASA officials the benefit of the most advanced analytical procedures and the factual basis they need to make the wide range of systems engineering decisions required. . . . We would have no objection to the establishment of a separate subsidiary corporation to do the job."

The top management of AT&T agreed, and within three weeks had organized BELLCOMM, Inc., complete with a board of directors and a full complement of executive officers. Although the new company's essential function might be capsulized under the term "systems engineering," it is both significant and intriguing that when BELLCOMM's directors chose its first president, they did not select a man known as a systems engineer. They chose John Hornbeck, a solid state physicist who had been executive director of the semiconductor device and electron tube division at Bell Laboratories. Furthermore, of the first 30 men who went to BELLCOMM, only one was known as a systems engineer.

It is axiomatic by now that to attempt an exact or concise definition of systems engineering is to walk into a semantic trap. Nonetheless, some generalization is helpful in understanding why BELLCOMM was organized as it was, and how it worked. Briefly, a systems engineer is characterized primarily by his viewpoint. It differs from that of a physicist exploring the flow of electricity in matter, who, however deeply he must dig, need be aware only of the relevant mathematical and physical theory. In contrast, in evaluating a complex system, an engineer must be aware of a wide diversity of factors. It's more a matter of viewpoint than of training. A physicist can become a systems engineer by gaining the necessary insight and accepting the challenge.

Hired experts in space technology

In addition to a natural inclination and ability to take an over-all view rather than dig deep in one place, the systems engineer must have a sufficient understanding of the components that make up the system. And so, in its hiring, BELLCOMM also sought people with expertise in the sciences and arts of space travel—men who could grasp the true nature of the many problems involved. Broadly speaking, BELLCOMM enlisted men whose fields of specialization included physics, geology, chemistry, electrical and mechanical engineering, mathematics, computer programming, psychology, aeronautics, astronomy, biology and many others. Most were men who had earned advanced degrees.

A man's ability to work with his fellow man was of prime importance, because BELLCOMM's assignment could not be accomplished without almost continuous consultation with each other and with NASA on almost every level. Abrasive personalities were not an asset. Men who preferred to work alone behind closed doors did not always find the ideal situation; to excel in BELLCOMM a man frequently found that he had to get around. Not least, a man had to believe in both the value and the feasibility of the project. Despite careful selection processes, some found the work unfathomable or unrewarding. Those who remained and succeeded were those who fitted the job. In effect, the job selected the people.

It is noteworthy that while the Bell System was chosen to supply the expertise that NASA needed, communications know-how *per se* was not the dominant skill that was applied to the project. By and large, the technical personnel of BELLCOMM were primarily highly educated and competent problem solvers. The review of a problem in terms of its scientific or basic engineering foundations was a keynote of BELLCOMM's contribution and the selection of suitable people was an essential beginning.

Collectively, NASA, BELLCOMM and the contractors involved a large number of highly competent people, many of them with strong opinions. The perennial problem was to develop solutions that not only were viable but that people felt they could accept and work with. Systems engineering consists of putting physical components together according to a rational principle. But egos had to be satisfied, and sometimes the greater problem was to organize people and their views without discarding the necessary rational principles.

BELLCOMM's function, as NASA headquarters sometimes viewed it, was to "look over NASA's shoulder," point out what they hadn't thought of and make suggestions for doing the job better. This is, at best, a tricky business, calling for enormous tact. Pride can be hurt; tempers can fray.

Because of the largely undefined nature of the Apollo project, the early BELLCOMM pioneers faced a substantial challenge in determining how to get started. NASA's contract with BELLCOMM had stated it was "to perform studies, technical fact-finding and evaluation, analytical investigations, consulting effort and related professional activities in support of manned space flight and related programs of NASA." But what *specifically* should their activities consist of?

The pervasive vagueness of the assignment was aggravated by the fact that NASA already had competent scientists and engineers who also wanted to attack the problems. The question was: How should the work be divided and assigned for maximum effectiveness?

In 1962 this was a tremendously difficult question. For while moon shots had been studied on a broad conceptual basis, no one had yet resolved the nitty-gritty practical details. Here the BELLCOMM people were in good company: The NASA people were equally in the dark as BELLCOMM joined them in probing what was literally the unknown. As one BELLCOMM man said, "You might say that the first year was a period of learning—learning what the problems were and what to do to help."

When they first arrived in Washington, almost everyone in the fledgling BELLCOMM technical staff concentrated on developing the Apollo System Specification, a document of primary importance because it delineated the over-all performance and design for the Apollo program and listed every major piece of hardware and what it was required to do. Like most of the other documents, this inch-thick specification was not quickly arrived at; it was laboriously hammered out in many hours of discussion involving the Apollo program office, the three field centers and their contractors, until it reached a consensus in 1966. "There was constant consultation and almost daily travel," says a BELLCOMM engineer. "We dug a hole through the sky between Washington and Houston."

As the BELLCOMM engineers worked to develop the fine points of this specification, the regions in which they could help NASA, by their probing more deeply, gradually came into focus.

They simulated the unknown

For example, it was at once evident that the astronauts would be up against an environment never before encountered by man, about which available scientific data were woefully inadequate. Among the hazards the astronauts would have to be prepared for were possibly lethal doses of radiation, including avalanches of particles from hard-to-predict solar flares, as well as showers of meteorites. Suppose they had to abort on a trajectory through the Van Allen Radiation Belt? What kind of lunar soil would their vehicle have to land in? Would it be solid or dangerously powdery? What was a safe angle of descent? What were the chances of the vehicle's tipping over? Could the astronauts see the surface clearly enough to guide their vehicle to a suitable spot?

These were only some of the questions that had to be answered.

BELLCOMM helped NASA identify the questions, then helped to evaluate them and to advise NASA what could or should be done about them.

In solving the complex problems of landing men on the moon, BELLCOMM engineers made much use of the science and art of mathematical modeling. They modeled the capabilities of proposed pieces of equipment. They modeled the trajectories required to take men to the moon—and bring them back. They modeled the surface of the moon and the dynamics of the landing vehicle. Later they modeled the problem of an orbiting sky-lab, literally a laboratory in earth orbit. Reaching into the future, years beyond Apollo, they modeled feasible interplanetary voyages to Mars and Venus.

Helped develop software

BELLCOMM contributed to the elucidation of the software problem. The digital computer programs used in the flight vehicle had to perform flawlessly to assure a successful mission. The development of such programs—software—is a relatively new art that is still evolving. Because of their experience in large Bell System projects, such as electronic central offices, and in military projects, such as the Titan I guidance system, BELLCOMM people appreciated both the concepts and the specific problems of software development. This knowledge was used to help develop procedures for managing and testing software and to critique the specific Apollo software based on sample tests.

In the choice of the best flight path for the lunar voyage, too, BELLCOMM struggled to help NASA's Apollo Program. A BELLCOMM engineer said: "A lesson from previous space projects showed the value of so-called reference trajectories to serve as a model against which to test hardware and the evolving mission operations. For Apollo, no one trajectory would do. A broader representation of the myriad possible flight paths had to be developed." Through the mathematical models already mentioned, BELLCOMM's engineers produced such trajectories and associated guidance analyses. Ultimately, says the BELLCOMM engineer, the company "developed an underlying strength, a deep insight into the essential nature of the entire intertwined web of mission parameters, which they put at the disposal of NASA Headquarters. This insight turned out to be a powerful, much-used capability." It was a major ingredient in lunar landing site selection, a job which occupied much of BELLCOMM's time during the later years and provided some of its finest contributions.

Now, with the Apollo Program nearing completion, it is planned that BELLCOMM will be phased out by April 1, 1972. There is ample testimony to its effectiveness during 10 years of co-existence with NASA. Just four days after the first human footprint appeared on the moon, NASA's associate administrator Dr. George Mueller wrote to then BELLCOMM president Ian Ross, "Thanks to the dedication, the perseverance and the vision of your organization, we have now carried mankind across the threshold of interplanetary exploration—a first step to an exciting new era." Another NASA official stated that "NASA could not have put men on the moon, as President Kennedy proposed, by 1970, without the special kind of assistance provided by BELLCOMM." And AT&T's Chairman of the Board, H. I. Romnes, wrote a letter to every BELLCOMM employee in which he said, "Your contribution was personal, but because of it the Bell System and the nation have important and lasting achievements."

There is no doubt among the people who worked with Apollo about the value of BELLCOMM's help in crossing the last frontier. As Dr. Mueller put it, "Your special efforts and your significant contributions to this epoch of space voyaging will never be forgotten by those of us who had the pleasure of joining with you in this, the greatest of all quests yet undertaken by man."

Dr. Brotherton, a former British subject born in France, took the B.S. and Ph.D. degrees in physics at the University of London. He came to the United States in 1927, when he joined Bell Labs. He worked for many years on wave filters and related devices. Before he retired from the Labs in 1964, he was concerned primarily with advertising in technical and scientific magazines. More recently he helped research and write The Man-Made World, *a radically new technical course for high schools, sponsored by the National Science Foundation.*

The Better to Serve

(PART I OF A TWO-PART REPORT)

Probably no other activity in the Bell System has a greater and more basic long-range effect on service, profits and employee morale than training and education. The System spends about $500 million a year in this area, if one includes trainee and instructor wages and salaries. Excluding that, the cost of instruction is estimated at $367 million, second only to the expenditures of the University of California. In numbers of people trained each year, the Bell System is first with 340,000, nearly three times that of the University of California, which ranks second. These comparisons, of course, exclude the Federal Government, which wins every statistical category hands-down. It is significant that during this period of economic austerity, engendered by the inflation-recession cycle, training is among the few conference-type activities in the Bell System that has not been seriously curtailed.

With regard to techniques of course development and instruction, business—and the military—have outpaced most public schools and colleges. And the Bell System is among the frontrunners in this field, while, paradoxically, in some areas of instruction the System continues to utilize backward techniques. It would not be entirely inaccurate to describe the over-all training situation in the System as appearing to be chaotic and disunited. But disunity and chaos can be symptoms of change, ferment and improvement. The picture is improving. So much so that AT&T was selected by the Department of Labor to represent the United States last year in Copenhagen at the International Conference on Continuing Training and Education during Work Life, sponsored by the Organization for Economic Cooperation and Development.

To grasp the significance of training, education and related problems in the Bell System, one first must look at the scope of this activity. Most extensive is the craft training conducted in the major departments, particularly Plant, which has more than 60 per cent of all System training, and Traffic, Commercial, Marketing and Comptrollers. When one considers that turnover on some jobs in certain geographic locations runs 500 per cent and higher over a six-month period, the volume of training becomes more apparent. The next general category of training involves administrative skills, usually from the first through the third levels of supervision. Such training is designed to better enable such people as the installation foreman, the group chief operator, the business office supervisor, to perform efficiently the functions of administrative tasks and leadership and management.

Finally, the System sponsors a number of purely educational programs, such as the Tuition Plan, under which employees may attend college and obtain degrees on their own time, with their company paying for tuition and sometimes other related costs. Today 7 per cent of the System's million employees have college degrees. This is true of nearly 24 per cent of the System's management. Those percentages are believed to be inadequate for the 1970's, with their exploding technology and greater demands on both craft and management to expand and improve service economically in a changing society.

The Bell System sponsors a number of on-campus programs around the United States. Third-level management people and above are selected by their companies to attend courses ranging from a week or so to one year. Candidates generally have demonstrated officer potential. Four Bell System management people each year are awarded Sloan Fellowships, under which they earn a master's degree in business administration. Each year more than 200 people employed by Bell Telephone Laboratories work toward a master's or a doctorate at two dozen universities, with all costs paid by the Labs.

Fifteen managers each year, selected by their Bell companies, attend an eight-week liberal arts course at Dartmouth, designed by the college from objectives provided by AT&T to broaden the thinking and decision-making ability of the students. This course is for department heads, or fifth-level management people. A similar course for division, or fourth-level, managers has been set up at Carleton College in Minnesota. Still other Bell man-

---

AT PLANT SCHOOLS AND AT PRINCETON, FROM COMMERCIAL DEPARTMENTS TO CARLETON, BELL SYSTEM COMPANIES EDUCATE AND TRAIN MORE MEN AND WOMEN THAN ANY OTHER INDUSTRIAL OR ACADEMIC ORGANIZATION ANYWHERE.

agement people each year attend a 13-week course on advanced management at Harvard; a 16-week Program for Management Development, also at Harvard; a six-week course titled American Studies for Executives at Williams College in Massachusetts, and similar programs at colleges and universities throughout the country.

Western Electric operates a $5 million facility near Princeton, N.J., to provide college type training for its engineers and administrative management people. The Corporate Education Center (C.E.C.) is situated unobtrusively on a 250-acre campus that includes a 300-room "dormitory" facility operated by a hotel firm. The center offers 375 courses and trains 7,000 live-in students per year in courses ranging from three days to 23 weeks. It also has a master's degree program, taught by faculty members of nearby Lehigh University in Pennsylvania, who travel to the center to instruct courses in such areas as physics, metallurgy, mathematics and industrial engineering. Master's program students, who move their families to the Princeton area, are assigned for one year to attend classes and work at the adjacent Western Electric Research Center. Western management people throughout the country are encouraged to volunteer for courses at the C.E.C. to keep current with technology and administrative techniques.

Training research group

AT&T has created a Training Research Group, headed by Dr. Harry Shoemaker, which helps the company's departments solve training problems, using methods and concepts of modern instructional technology. The group is staffed by instructional specialists including psychologists and educational writers. Its roles primarily are to assist in identifying training problems and helping to determine requirements for development of new or revised training; help with in-house training development; assist in negotiation and monitoring of contracts for training development involving outside firms; evaluate new developments in instruction and promote ideas that promise to improve instructional effectiveness or efficiency, and promote upgrading of skills of System training personnel. They work mainly with the various departments at AT&T but occasionally directly with training people in the companies.

The Plant Department, to meet its training needs, which include not only keeping up with changing technology such as Electronic Switching Systems (ESS), but also revising existing training to reflect new and better techniques of course development and instruction, has set up a *fair share plan.* Here each associated company prepares training for the System commensurate with the number of employees it has. The training is planned and coordinated by a Plant Training Advisory Board. The board is chaired by Fred Wells of Plant's training group at AT&T.

The fair share program is one of the most successful and widely used training strategies in the Bell System. Here are its goals:

To identify needs for training; develop training courses to meet the needs in a *timely* manner; set standards for development, facilities and instructional media to assure high quality training; gain mutual trust among the companies in one another's training programs; eliminate duplication of effort; foster the commitment of needed resources to develop and administer training; develop skills among personnel needed to develop high quality training; use the most advanced techniques of instruction and training development.

Wells's group receives word suggesting need for new or revised training. The group's first step is to ask an operating company to explore the need and recommend to the board how to deal with it. This provides a safeguard against getting involved in a long and expensive training development project when training is not the right answer to the problem.

If the board judges the need to be sufficiently important, it will assign a company to develop training. The company then accepts responsibility for developing the course so as to meet quality standards and be used by other companies with confidence. Wells's group monitors the development projects and consults with the companies to help them meet their goals, as well as the goals of the Bell System. The finished products are submitted to the board for approval as standard Plant courses and are printed and made available to all companies.

11.7 million hours of training

Plant has more than 1,400 classrooms in the System, provides 11.7 million hours of classroom training for craftsmen each year, has developed 130 standardized training courses with all related materials and tests, and counts another 2,500 courses developed for use of individual companies.

The Plant Operations Training Center in Atlanta is a modern classroom facility with an ambiance of corporate academia, set in a pine-clustered executive park removed from the business district. The center was designed to provide the plant district head with technical knowledge needed to run his job. The center is an AT&T facility and trains 2,400 people a year, mostly third-level Plant men. It, too, has live-in facilities. A special course for executives who lack a Plant background has been set up, and classroom chairs are filled regularly. Seats in the school are allocated to each company on a pro-rata basis, with each seat costing $250. Each course lasts five days, and, ideally, each district head should attend all six courses—plus a seventh being developed for the hardware-software aspects of Plant operations. Odis Peters, a veteran Plant Department trainer who designed the center from the ground up, explains the need for the facility this way: "Today so many of our third-level and higher management people don't know enough about the technical aspects of the area of their responsibility. They can't ask intelligent questions or provide effective guidance or coordination for their subordinates. As a result, first and second-line supervisors are calling many critical shots that are affecting the entire Bell System." Peters submits that critical decisions with long-range effects on the System should not be left entirely to foremen. While the first two levels of supervision do of necessity have the most detailed technical knowledge, higher management—with their broader view and presumably more seasoned judgment—should be in on the decision making. But many are hampered by ignorance of technology. Hence, the Plant Operations Training Center.

The Traffic Department relies heavily on two training groups at AT&T, one headed by Dick Peterson and the other by Don Heck. Peterson, an industrial psychologist hired by Traffic in 1960, is responsible for research and planning. Heck, moved in from a line job in Traffic, is responsible for course preparation. The two groups work hand in hand, with the help of Shoemaker's Training Research Group. Heck's group, with a budget of $1 million a year, prepares, maintains and enhances operator service training for the companies. Before Heck's group was formed, Peterson developed the *programmed* training course for operators, one of the System's first truly *validated* training packages. Almost all nonmanagement training for Traffic is prepared by Heck's group, numbering 35 people, all of whom are trained to utilize the latest methods of course development. Most of the training is centered around interaction with people, as opposed to the more equipment-centered Plant and Traffic engineering training. Traffic depends on Personnel Department training packages for most of its management training, while engineering instruction is provided mainly at the Bell System Center for Technical Education at Lisle, Ill.

Company-provided training

The Commercial Department looks to a group at AT&T headed by Jim Broshar for Training guidance. Broshar transferred from a Commercial assignment at Northwestern Bell more than two years ago. As training manager, he supervises a group of five people who write management training material, mostly for business office supervisors and managers (first and second-line managers). With the exception of training materials for certain new Bell System services or procedures, the companies provide their own nonmanagement training, with advice from Broshar's and, again, Shoemaker's groups. Like the Plant and Traffic training people, the Commercial trainers at AT&T provide training for Commercial instructors and course developers in the field. Broshar and his people help companies in the course development of their craft training. If one company comes up with an effective training package, the AT&T Commercial trainers assure that the other companies know about it. Like the other training groups at AT&T, Broshar's people act as a clearinghouse for ideas.

The Marketing Department has taken great strides to improve its training and has made some of the greatest advances in the Bell System. John O'Connor heads a group of seven as Manager-Training at AT&T. His people, working with Shoemaker's group, provide over-all planning and supervision for Marketing training development, about 60 per cent of which is prepared by outside contractors. Most sales training packages are prepared by O'Connor's people. Advanced sales, data and PBX training is prepared by outside firms with close coordination by AT&T. "Our goal is to make training more job-relevant and more oriented to the student than to the teacher," says O'Connor. "This way the Marketing man need learn only what he needs to learn to do his job, and when his job changes, he can immediately obtain the training he needs to perform his new tasks." Speaking of the self-instructional aspect of Marketing's courses, O'Connor says: "With our training packages, a salesman can begin training the day he is hired, rather than wait for five or six more new hires to form a class. If he has to drop out because of illness, he can pick up when he returns and move through the basic course as fast as his ability will permit. Some can whip through a course in two or three weeks, while others require longer. So you can readily see that the new training lends us considerable flexibility."

The AT&T Marketing training group presents new training packages to the operating companies, demonstrating the best techniques of instruction, then lets the companies run with the ball. Some training in the field is monitored to check the effectiveness of the training packages, and questionnaires are sent to trainees and their supervisors after the trainees have started to put into practice what they have learned. O'Connor explains that Marketing generally is moving toward individual-paced training, but economics and subject material ultimately dictate the format of instruction. "Indications are that the students seem to like the training," he says, "and a higher guaranteed level of learning with greater uniformity of instruction throughout the System are apparent."

Marketing learning centers

Marketing has set up a number of learning centers around the System, armed with some of the most advanced training programs to be found anywhere. A facility in Chicago serves Marketing people in Illinois and adjacent telephone companies. Staffed by nine instructors, the facility offers 14 courses, developed mainly by its own staff, and falling into three categories: voice and data communications and specialities. All are sales courses, taught at basic, intermediate and advanced levels. Joe Lullo, the center's manager, cites the school's layout—classrooms without walls, or *conference areas* that are part of a working office. This provides a more realistic business setting, rather than a classroom environment. Yet, the facility has learning carrels (self-instructional cubicles) and rooms for film and videotape viewing and practice sessions with videotape recording equipment. "We're not hung up on self-learning programmed instruction," says Lullo, "although it plays an important role in training programs. We recognize that self-learning isn't nearly as good for developing sales pitches as letting the guy make a pitch, then observe his own strengths and weaknesses on a videotape recording that's played back during a critique session afterward. Our emphasis here is heavily on role playing." Lullo's facility trains about 800 Marketing people each year. This constitutes all formal Marketing training for the companies primarily served by the center. The curriculum is designed and improved with assistance of a training advisory team made up of district marketing managers and Lullo.

The Comptrollers Department has been heavily involved with training, since the hardware manufacturers unbundled instruction as part of their priced package. (An article on the Comptrollers training facility in Denver appeared in the May-June 1971 issue of *Bell Telephone Magazine.*)

In addition to its campus study programs, Bell Labs assigns some 3,000 engineers and scientists each semester to spend two hours of their work week in structured classes on company premises and twice that time in outside company preparation. The Labs taps its best people to conduct the instruction. The curricula, unconventional by university standards and generally unavailable on campus, are tailored to the needs of the Labs to strengthen specialists in their areas of expertise, to keep professionals current in fields other than their own and to provide the advantages of a structured program to any person whose work pressures may have caused him to become rusty in certain subject areas. Concurrently, another thousand Labs employees attend less formally organized classes out-of-hours each semester.

Additional Labs instruction

The Business Information Systems Program (B.I.S.P.) people at Bell Labs have an elaborate training group that has the advantage of being able to prepare instruction as B.I.S.P. is developed. B.I.S.P., of course, refers to expanded use of computers in the telephone business beyond the more routine chores of bookkeeping. Ollie Holt and Fred Stevenson of the B.I.S.P. group are directing training development. They are utilizing virtually every instructional medium available, as well as an avant-garde approach to development, known as Personnel Sub-Systems (P.S.S.). "We got this plan from the American Institute of Research," says Stevenson, "who developed it primarily for the Air Force to redesign their weapons systems. We believe we're among the few in the System, and in the rest of the civilian world, who are using it in its comprehensive form."

P.S.S. calls for design of a work module with a complete task analysis; design of performance or job aids; human factors engineering; tool and data source design where needed; writing of practices, and lastly, preparation of training. Because of the development stage of B.I.S.P., and with use of P.S.S., Holt's group is working under nearly ideal conditions, with the task of training preparation simplified when compared to training jobs in other places. Stevenson's group develops and provides instruction to those people who are doing the P.S.S.-oriented development of B.I.S.P. They also are charged with developing training and instructors for the companies, which will have to localize training packages, just as in other areas of operation.

Training facilities vary by department around the System. Plant conducts its instruction in plant training centers designed and equipped only for such activity. Commercial administers its training usually in rooms adjacent to the business office, as well as right in the business office itself, while Traffic conducts most of its training on the boards and in special training rooms nearby. A shift toward individualized instruction among Plant craftsmen, service representatives and operators is under way.

Centralized training facilities are becoming more popular around the Bell System. Southwestern Bell has an interdepartmental training facility in Dallas, which provides almost all advanced or specialized training for the company. The school, similar to the Plant training center in Atlanta, has 30 instructors, headed by George Alston, who, like Peters in Atlanta, designed the center and almost everything in it. The Dallas school has adjacent apartments for resident students, who number about 200 a week. About 60 per cent of the training is for craft people and the balance for management. Southwestern relies to a great extent on courses developed by AT&T. Alston cites interplay among trainees from different geographic areas as one advantage of conducting training in a companywide facility. "They get exposure to new ideas and see others are having similar problems in other states in the company," says Alston. "We're learning quickly that you have to have good instruction for these younger people, because they're more sophisticated as a result of exposure to TV and everyday communications." Classrooms are modern, comfortable, equipped with various media for instruction. Instructors and students, as at other Bell training facilities, get down to the business of learning immediately and stay with it until the day's assignments are done.

Development of training also varies around the Bell System. Plant has its fair share plan; Marketing contracts much of its training preparation outside the System; Traffic has centralized much of its training development at AT&T; Commercial depends on the associated companies for a good deal of its training, and Engineering has centralized preparation to a great extent at Lisle, Ill.

AT&T's "college" at Lisle

In Illinois Bell, training development has been centralized at General Headquarters in a group of 83 people headed by Bill Haarlow. They develop all training for Illinois Plant, Traffic and Switching, utilizing many of the latest techniques. The group is especially concerned with the need to check the effectiveness of its training after the student returns to his job in the field.

Probably the greatest example of centralized training in the System is the Lisle Center for Technical Education, another AT&T facility. Like Western's Corporate Education Center, the Lisle facility resembles a small college, inside and out. Dormitory and recreational facilities are connected to the learning center, so students never have to step outside. The school was begun primarily for Engineering but has expanded to include all types of training, 25 per cent of which is for Traffic. The school is on a 22-acre site and has 10 classrooms, five laboratories for *hands-on* training (including a complete No. 1 ESS machine) and 28 case-study rooms. Some 6,000 Bell System employees go through 41 courses each year.

All are management, from first level through executive.

Director Chuck Sener has 91 instructors, almost half of whom are working in various stages of course development, coached by three professional teachers hired from outside the System. Eight courses are being developed for the companies. The courses developed and taught at Lisle are usually those that the companies cannot provide for themselves because of costs or the small numbers of employees requiring the training. Instructors are brought in for two years from the various companies.

"It takes about two weeks to train them," says Sener, "then we help them along as needed for the first class or so they teach. Our recruiting is based on the person's technical knowledge and ability to answer any and all questions about his subject matter. Students are more forgiving of errors in grammar or dry delivery than they are of inability to answer the *hows* and *whys* of the course material."

Besides coordinating with all departments in the companies on training needs, the Lisle people provide training for company instructors. Training at Lisle utilizes lecture, problem-solving and group work formats, with emphasis on the last two. Bell Labs behavioral research people and Sener's group are developing a *course maintenance system*, utilizing a computer, which is designed to tell what a student brings to class in the way of background and current knowledge; whether or not he received the information for which he was sent; if and how it changed his job performance afterward, and whether or not he used the information gained in his training. So far no other major company—Bell or outside—has such a system. Nor does the Federal Government. Fred Luecker, in charge of planning at the center, says: "A lot of people, including the government, are waiting in the wings, watching to see what we come up with here. We hope to have the system in operation in about a year."

Under the plan, the student will be tested for prerequisite data before he begins the course. Tests related directly to the course material will be administered and results stored in the computer. Questionnaires will be sent to the student and his immediate supervisor after he returns to his job in an effort to re-evaluate his skills developed and their value to him. Resultant data hopefully will indicate how each course might be improved or updated. The main objective will be to keep training relevant to reality.

Personnel programs

In an effort to help management people to cope with problems, Personnel departments throughout the Bell System are developing various programs and processes. One part of Personnel engaged in this effort is the Management Training and Development Section at AT&T, headed by G. C. Ermey and A. E. Farrell, Jr. Four major areas of their responsibility are:

Management training courses, developed, tested and introduced to the System in response to what the companies feel is needed. Courses being offered are Initial Supervisory Training; The Second Level Job; Factors in Decision Making; Planning, Organizing and Controlling; Development Planning; Coaching; Financial Management (Financing Services for the 70's, developed in concert with the State Regulatory Requirements Department); Personal Factors in Management; Communications Workshop, and Urban Orientation. These courses are sent to the field, who in turn tailor them to meet their own specific requirements. They are management development courses in that they focus on the individual manager and his role. The manager usually is trained with his peers from different parts of his organization.

Organization Development, as defined by some, is a planned effort to increase organizational effectiveness and health through planned interventions in operational processes. It differs from classical management development approaches in that representatives from various parts of the organization meet in specially designed sessions to examine alternative ways of being more effective as a work unit. Group members learn methods and theories they use to solve their own problems and to improve their ability to help others work on problems they are experiencing. O.D. is an outgrowth of a number of studies of how people perform in organizations, conducted mainly by behavioral scientists.

The Management Development Section also trains Bell System personnel required to conduct these programs. Two courses conducted by the section to meet this need are Leadership Training and a Basic Consulting Skills Workshop. Leadership Training is a *laboratory* approach that encompasses theory, self-awareness and leadership practice. The Basic Consulting Skills workshop is designed to assist management development people or others who are asked for help from various parts of the organization.

Finally, the section acts as consultant to Bell companies. Such contacts occur through scheduled Bell System Personnel Network meetings and through periodic visits in which the role of the department is continually examined so as to provide more assistance in management training and development.

Planning for action

One of the most recent offerings the Management Training and Development Section has developed is called Planning for Action. The process was developed as a result of requests from the associated companies for a management-by-objectives approach to help managers in their efforts to achieve important goals. In Planning for Action, managers, working together in natural work teams, plan and implement immediate action programs aimed at accomplishing specific performance goals. Special methods are suggested to make certain that the goals will be achieved. The process is organized around: Identifying potentials for improvement; tapping these potentials in successful improvement projects; programming and controlling progress toward goals; building a continuing process of improvement.

(Editor's note: In the next issue of Bell Telephone Magazine, *Dr. Harry A. Shoemaker, Training Research Manager at AT&T, will discuss various philosophies of training and their future in the Bell System.)—Marco Gilliam, Associate Editor*

A New Top Team for the Bell System

AT&T's Board of Directors have elected John D. deButts, Robert D. Lilley and William L. Lindholm to the respective posts of board chairman, president and vice chairman of the company. The new management team will assume Bell System leadership April 1, following the March 31 retirement of H. I. Romnes as chairman and president. DeButts will become chief executive officer.

The AT&T headquarters organization will be restructured into three major departmental groupings, also effective April 1.

Departments responsible for the company's financial and regulatory activities and the conduct of its relationships with employees and the public will report to Lilley.

Reporting to Lindholm will be departments responsible for assuring quality of Bell System service and management of resources necessary to provide it. He will also be responsible for coordinating the activities of Western Electric, Bell Laboratories and the Long Lines Department of AT&T.

Cornelius W. Owens, executive vice president, will have reporting to him those organizations responsible for corporate planning, including market and service planning, organization studies, business research and the application of economics and management science to the solution of business problems.

John D. deButts still retains a soft southern accent from his origin on April 10, 1915, in Greensboro, N.C., where his father managed a small railroad. DeButts entered the Bell System just after he was graduated from Virginia Military Institute. He was offered a job with the C&P Company of Virginia as a traffic department trainee in Richmond. He spent the first 12 years of his career there, then started moving rapidly in the System—to AT&T as an engineer, back to Richmond as general traffic manager, then back to AT&T as an assistant vice president. There followed stints in Washington, New York Telephone and again at C&P before he became, at 46, the then youngest Bell company president, at Illinois.

DeButts says he and his wife, Trudie, whom he married in 1939, didn't mind moving all over the eastern seaboard, but it was a problem at times when their two daughters, Talbot and Mary Linda (now Mrs. Tyler Cain and Mrs. R. Collins Couch), were in school. Since their move from Chicago to New York in 1966, Mr. and Mrs. deButts have lived in a city apartment. "It was my wife's preference," he says. "The children were gone, and she really enjoys New York." Recently, however, they bought a weekend home in Fairfield, Conn. "Pheasant and quail hunting are among my great loves," says deButts, "and have been since I was 12 years old." He also likes fresh-water trout fishing in Wisconsin.

DeButts has served as national chairman of Junior Achievement and on the national executive board of the Boy Scouts. "My basic interest is in young people," he says, "and I try to devote as much time as I can to activities involving youth."

Robert D. Lilley was born in the Bronx on August 16, 1912, and grew up in New York City. He earned degrees in mining and engineering as well as in liberal arts at Columbia University.

Lilley joined Western Electric at its Kearny Works in 1937 after working as an engineer in the coal industry. He progressed through a variety of posts at Kearny, Baltimore and New York. In 1960 he was elected a vice president of Western.

Lilley became president of New Jersey Bell in 1965. While in that job he headed the Governor's Select Commission to study Civil Disorder. The commission's controversial report led to changed minority-hiring policies among businesses, new private and governmental programs for minorities and a grand jury investigation that resulted in prosecution and conviction of corrupt local government officials.

In 1970 Lilley was made an executive vice president and director of AT&T, heading its new Human Affairs organization.

Lilley lives with his wife, Helen, in Short Hills, N.J. He met her at Western Electric, where she was working as a secretary.

They have three children, all out of college now. His son, Rob, a Yale graduate, is involved in ranching in Oregon. One daughter, Jane, has a degree from Skidmore and is interested in teaching, while the other daughter, Margaret, is interested in photography after attending the University of Colorado.

Lilley enjoys "going slack and being disorganized" when away from the busy schedule of his office in downtown Manhattan. He reads widely in non-job-related fields such as geology and archeology, likes to watch sports and "to spend time with my wife."

William L. Lindholm was born on May 27, 1914, in Mountain Grove, Mo. The son of a telephone company lineman, Lindholm thus grew up with the concept of Spirit of Service. Although he entered the University of Alabama with the idea of becoming a doctor, he switched to economics and was graduated from the University of Missouri in 1936 with a bachelor's degree in business administration.

After unsuccessfully looking for work in Mexico, Lindholm got his first telephone job with Southwestern Bell in Dallas on October 1, 1936. Oddly enough, he started as a service representative—the only male service rep in Texas. "It was sort of an experiment," he recalls, "putting a man in that job. But I was dealing with people, customers, and I learned a great deal. I didn't care for being called 'Miss Lindholm,' though."

Less than two years after starting with Southwestern Bell, he became a salesman and progressed through a variety of jobs for Southwestern in Texas and Missouri before becoming vice president for the Texas area of the company in 1963. Two years later he went to Washington, D.C., as president of The Chesapeake & Potomac Telephone Companies. On April 1, 1970, he was named an executive vice president for AT&T with responsibilities for operations, engineering and construction. Lindholm's style of management is one of directness. "I prefer to talk to people face-to-face," he says. "It's no problem making decisions; the trick is to make the right ones."

Married in 1939, Lindholm and his wife, Eleanor, recently moved into a new home in Mendham, N.J. They have a son, Robert, who runs a child care center in Dallas.

Cornelius W. Owens has been a resident of New York City for the past 11 years, yet he still retains the Back Bay accent of his hometown, Boston, where he was born 59 years ago on July 30.

Owens holds a bachelor's degree from Boston College, where he attended school on a football scholarship. He played for three years as an interior lineman. "They wouldn't let me touch the ball," he recalls.

After graduation in 1937, Owens joined the New England Telephone Company as an installer. "A really tough assignment," he recalls with tongue-in-cheek, "installing phones at Wellesley College." During his years with the company in Boston and Providence, R.I., he alternated between staff and line positions. In 1960 Owens left New England Telephone to become assistant vice president of plant for AT&T.

A year later he was named a vice president of New York Telephone Company. In 1963 Owens returned to AT&T as a vice president and later became an executive vice president of the company. In 1965 he was named president of New York Telephone, a post he held until he returned to AT&T as executive vice president in 1970.

He views the job of the manager as "...the same, no matter what level. The manager must keep people informed, give them room to develop and progress and make sure the working conditions are pleasant."

A widower, Owens resides in an East Side Manhattan apartment.

For exercise, he likes to play golf and tennis and to swim. He also says he would think nothing about walking 30 blocks through New York streets to visit a museum or to go shopping. An avid football fan, Owens traveled to seven college games last fall.

The Politics of Creative Tension

A prime function of top management is to elicit candid expression and new ideas from middle and lower management, giving them an opportunity to share in goal setting and related opportunities and risks.

by Henry M. Boettinger

Ours is the first age in which *formal* knowledge and academic research findings of human psychology have been consciously applied to improving the effectiveness of organizations. As in every other collision of developing theory with decades of practice, the process has produced much controversy, a great deal of nonsense and some advance in understanding by both sides.

But what caused the collision to occur?

I believe the glue that had proved adequate for simpler arrangements of organized human effort no longer was able to withstand new and stronger forces that ruptured old relationships among the individual persons of organizations.

When the symptoms of breakdown proved more than a temporary aberration, some enlightened managers were willing to explore new ways to arrange their enterprises so that their people would put more of their energy toward the aims of the organization and less toward those senseless battles where everyone loses. Again, as our race has experienced since Moses listened to Jethro, there were men in the wings—investigators, scholars and researchers—eager to apply and test the results of their work in the larger world of industry and commerce.

After all, the first syllable of management is *man*... and it was high time that managers began to seek a deeper understanding of the basic cell of those purposefully structured personal relations we call *businesses*. Managers have known for about a century to use physical scientists to advance the technology of their equipment, tools, products and services. Why not try the same thing with the people who run the plants, make the products and deliver the services? Sensible, but, alas, far more difficult. Yet, enough has been learned so that even if we don't know how to build a perfect organization, we at least know what no longer will work well, and we know some approaches that hold promise. In this field one does not find certainty, though some fanatics do perpetrate certitude on the unwary.

As long as something we use works as we expect it to, no matter how complicated it is, we are quite incurious as to *how* it works. So many other things are breaking down, falling apart or malfunctioning that we must place all our attention to righting them.

Whether an automobile, a watch, television set or new-fangled plumbing, we are eager to learn about their innards only when they disappoint our expectations by acting up in strange ways. If we must fix them ourselves, we need understanding of their operation in order to begin repairs without causing more damage. In a device we pay others to put right, we want to know first what we are paying for and whether we are not better advised to scrap it and buy a new one.

So, too, with the persons we know, hire and report to. We become interested in *their* motivation

only when their behavior frustrates our objectives. All of us have notions, ideas and views as to what will make someone do something. Some believe that fear works best, whether fear of physical punishment, of ridicule suffered in front of colleagues, of public disgrace or of guilt when his actions are seen by himself to violate standards of his duty, honor or profession.

Many successful organizations—schools, armies and navies, churches, universities, government departments and businesses—have used this principle in the past and will try to use it in the future. It works only to the extent that the organization can deprive a person of a great measure of free choice (what older writers called liberty) and can constrain him in some way to remain under the authority of him who administers the discipline. It also needs to prevent retaliation by the man punished—or by his friends. Mutinies, rebellions, slowdowns and sabotage are the flowers of evil in the gardens of fear. Those who glue their organizations together solely on the basis of fear require overseers, not subordinate managers, because their assumptions about human beings see them as lazy, shiftless, contemptible and unreliable. It is a melancholy fact that such assumptions often are confirmed by those who base their actions on them because they constitute a self-fulfilling prophecy.

The organization needs people more than they need the organization

Behavioral science research shows that people will tend to behave in ways that conform to the views superiors hold about them, whether in families, industries or nations. Why should this interest managers? Simply because they need people to do things *without* provoking undesirable reactions. Times *have* changed, and organizations in an advanced, technologically based economy are far more vulnerable to disaffected personnel than ever before. In many cases, the organization needs them more than they need a specific organization. What worked as motivational and recruiting forces when people lived under conditions of hunger, when just to have *any* job was the highest of blessings, and when fear of want and destitution for their families would cause men to put up with horrifying environments, will simply not do the job we need today. What worked with primitive technology will disappoint those who need to trust increasingly expensive and complex apparatus to the care of their employees.

In some cases we observe that the cure appears worse than the disease

Advances in social services available to all and the increased power of unions to rally round an allegedly mistreated member are facts all managers must face. In fact, some hold that such collective security arrangements were a necessary concomitant to the rise of hierarchical structures in all areas of modern life. They see them as countervailing power, designed to offset potential abuses, but in some cases we can observe that the cure appears worse than the disease, especially when a countervailing power overwhelms the viability of an institution that loses its dynamic thrust when subjected to too many constraints. But those are pathological cases, and things are not nearly so grim if tensions can be properly balanced. Heraclitus's ancient message of 500 B.C. is a more optimistic guide: "Men do not understand how that which is torn in different directions comes into accord with itself—harmony in contrariety, as in the case of the bow and lyre. Hidden harmony is better then that which is obvious."

The opposite organizing principle to fear is love . . . a word made almost tiresome in our country because it now dominates the placards of street demonstrators. We are hardpressed to find any one organizational experiment based on this principle that survived, whether primitive Christianity, the social towns of Fourier and Owen or the new youth communes. Man appears to be too imperfect a material at this stage of his development to realize such mystical visions, but we should not underestimate the impulse that drives him to conceive and yearn for such societies and to judge those in which he finds himself by the standards of his dreams.

So we have the two absolutes, fear and love, but every manager knows that he can use neither of them in their raw form in pursuing some form of harmony in his enterprise. Let us face the harsh fact that every person in an organization lives his life in two social systems that contradict each other in their logics, beliefs and criteria of success. Vannevar Bush calls them: (1) the *hierarchical* systems, characterized by relations of superior and subordinate, and (2) the *associative* systems, characterized by relations of equality and collective memberships. They constitute a true duality for every human being, a dilemma and frustration for those who do not perceive them correctly, a source of constant renewal for those who do. The prime criterion for a hierarchy is efficiency, and each element is judged by how he contributes to its goals.

The prime criterion in the associative system is how much it augments a person's humanity, gauged by informal relations with his fellows, by his personal growth in all those dimensions of his personality, which often are irrelevant to his place in the hierarchical system, and by bolstering his self-respect. In most hierarchical systems a man's sole value lies in his contribution to *collective* effort; in the associative system, by the reputation he enjoys as a person.

Of course, these are academic categories, and they overlap in practice. A member of a social group in a pub or a labor union recognizes his place in its particular status system; and a man in any well-run enterprise is a member of at least one of its associative groups, whether based on a particular shop corner or on a specialist's expertise.

These overlaps offer the manager a way to produce a new harmony from old opposites, by creating ways to satisfy a person's needs for an associative system while at work in the hierarchy. Another aspect of the two systems' interaction is found in how the hierarchical systems are changed. Changes occur—from total governments to the smallest organization—because of new groupings in the associative systems. A new grouping around a new idea in a board of directors (an associative system) can change the top management of an enterprise or its entire lines of business.

It is difficult for a hierarchical system to change an associative system *except in furnishing that system either a grievance or an opportunity*, which becomes the trigger for new groupings.

Bad managements will produce a stream of grievances; good ones can furnish a series of opportunities. The new groupings that evolve as responses in the associative systems will be different with different stimuli and will cause different leaders to emerge within the associative system who will appear as the standard-bearers of their colleagues' views.

How to change an organization is the key challenge to management

An organization faced with change in its internal or external environments must change itself. One of the ways it can do this is to let itself *be* changed by the associative systems in which its employees are members, or by creating new associative systems where their place and contributions as *individuals* can complement their role in the hierarchy. How to do this represents the key challenge to a management desirous of adapting its organization to major change.

There are now extant in management literature several approaches directed at various aspects of the motivation problem, *e.g.*, job enrichment (the therapeutic reaction to over-fragmentation of human tasks), management development (essentially training processes to alter supervisory styles by teaching new techniques or to increase self-knowledge awareness by sensitivity training) and by participatory arrangements (known as Management by Objectives, and Organizational Development). Each has a place and has important contributions to its credit, but most of their application and impact has occurred at the middle management levels and below. All their improvements must take place within the boundaries set by the hierarchical systems *above* them. Can higher management use these approaches, and, if so, how? They can, but it requires a new form of open-mindedness and changes in attitudes habitual to those at the top.

First they must recognize the duality of their own positions, seeing both their hierarchical and associative dimensions, and be convinced of, at least be willing to experiment with, the idea that change must originate in the associative system and be implemented by the hierarchical. This is not trivial and carries personal risks, because the associative mode strips them of the protection implicit in the role of superior over subordinates. They must change accustomed behavior, and that is never easy. However, a slight digression to some results of psychological research might help lay a foundation for practical suggestions.

Dr. Paul Ello states there are four hypotheses of motivation that have stood the rigorous testing of empirical experiments well enough to be embraced as principles. These are:

1. All behavior is *learned* behavior, *i.e.*, there are no inherently non-motivatable persons.

2. A person's self-image determines his behavior.

In situations involving two people, four images interact—

John's image of himself
Paul's image of John
John's image of Paul
Paul's image of himself

3. All behavior is motivated by self-gratification.

4. All behavior is problem solving, goal oriented and therefore *future* oriented.

Highly motivated persons are those who view their jobs as vehicles that allow them to realize their self-images. When a job is so narrowed as to constrict that drive, the person holding it degrades his performance to meet its minimal standards and unconsciously expends a great deal of his mental energy in keeping himself within its boundaries. The success of job enrichment, *i.e.*, increasing the boundaries of a job for those who want them larger, has been seen in reduced absenteeism, increased productivity, more candidates ready for promotion and less concern for the clock. This could have occurred only because the barriers to realizing their image of what they could accomplish were demolished, and with them the inner frustration and rage that manifested themselves as disinterest, absence and minimal effort.

Communications methods have less emphasis on the listening half

The problems of perception of images, with all their permutations of distortion, have led to more attention to communications methods.

But these have been highly biased toward the *telling* half of communication, with less emphasis on the *listening* half. This is understandable, because all the ordinary, low-cost media, dear to the hearts of employee information specialists, are the mass media of print and broadcasting. One premise appears to be that if people are exposed to management views, they will in some mysterious way do more or better work. Perhaps, but only if the image perceived of management (through broadcast messages) convinces them that a new program or policy reinforces their opportunity to reach their own aims and goals.

Otherwise, such information will be counter-productive. A good information program must take account of the way its audience sees *itself*, as well as how the originator wants the audience to see *him*.

This sort of knowledge requires some kind of face-to-face, ear-to-ear contact among the people involved in the communications process, otherwise transmitters and receivers are tuned to different wavelengths, both fully operating, but no worthwhile contact takes place between them. The principle that behavior is problem solving, goal oriented and future oriented offers the manager his best hope for inducing behavior that contributes to the realization of *his* purpose. But he must find ways to show that the goals he wants achieved are supportive of the goals his subordinates want achieved for their own self-gratification. The obvious way to secure such congruence is to have the goals determined together. This accounts for use of organizational development and management-by-objectives methods—the participatory schools of management. But there are few ways to use them well and many ways not to. When employed without skill, the methods degenerate into complaint sessions, producing no useful output, pursuing objectives of minimal organization accomplishment—enough to "get by"—and creating no sense of personal triumph over difficulties. All of these techniques are simply methods . . . they are not ends in themselves, only means *to* an end. Managements who decree that they be used merely have placed a tool in their subordinates' hands . . . and one that can have destructive results without example or training. Disenchantment with their use can usually be traced to a naive expectation that "to *have it installed* is all we need do." The history of misguided computer installations offers a parallel path to disaster. In the application of behavioral science-based management ideas, top management sets the tone by example, conduct and emphasis. Their actions speak so loudly that they will drown out their words.

Vannevar Bush cites an example used in military hierarchies where the change to the associative mode is made quite explicit. A transformation is signaled by the statement of the man in charge of a meeting that "I'm turning my hat around." This cryptic remark is immediately decoded by the participants into this message: "I want each and every man here to behave as though we are all equals in pursuing a solution. Throughout the discussion, every idea you have, however fanciful or heretical, can be—and should be—advanced so that others can build on it. No one will be allowed to trample a suggestion merely because he holds higher rank. I will do my best to tell you the facts and problems as I see them, but if you have more or better facts, or can prove mine wrong, now is the time to let us have them. Every one of you has knowledge superior to mine on some aspect of this problem. I need your brains, and our people need a plan. At the end of this session, I will finally take responsibility for the decision we come to. When I am ready to do that, you will see my hat in its accustomed position, and only then will we issue directives to execute our decision."

At times the leader should be the most neutral man in the room

The entire purpose of such sessions is to elicit *individual* contributions, and the greatest difficulty of the leader is to make it safe for them to surface. He must constantly be on guard against his natural instincts to dominate the discussion—at times he should be the most neutral man in the room. These are not trivial exercises. Regardless of their informality and structural looseness, the results of such associative groupings will shape the enterprise's *future* far more than will the more orderly and apparently efficient sessions of the hierarchical system's command mode.

Before leaving this point we should note that *the future* of an organization needs some clarification. All its *possible* futures are limited only by artistic imagination; its *probable* futures can be assessed by scientific analysis of technical and market factors; but its *preferable* future is a matter of politics—both interior and exterior. The associative groupings combine all forms, but are essentially political when they converge toward a preferred course of action or policy and persuade the hierarchical system to implement it.

One way that the hierarchical system can arrange its affairs in line with some of the principles of behavior is to make explicit distinctions in the form and content of its implementation orders—after the strategic planning process—as they percolate through various levels to the individual worker.

Here is a scheme for three levels:

1. The highest level tells the intermediate level subordinates *what* is to be done, *when* it is to be accomplished, the amount of expenditures that cannot be exceeded and the criteria of achievement. They make it clear that *how* it is done is completely a matter for the intermediate level managers, and they are free to make any innovations or use any methods within the time and budget limits. (Some enlightened managements allow a portion of the savings in time and money from successful innovative approaches to remain in the intermediate level's control, as seedcorn for innovative risk taking on future projects or current task improvement. This is an internal variant of the *plowing back of profits*, which characterizes older concepts of high capitalism. In the hands of a good manager, such a discretionary development fund grows profitable innovations with compound interest and supplies motivational positive feedback of great power.)

2. The intermediate level takes the "*what* is to be done" from above, and breaks the task down into contributions required from the components of the lowest level . . . their answer to *how*? in *organizational* terms. They then translate this into statements of *what* is to be done for the lower level, in finer detail, again with time and budget limits, telling the lowest level that *how* their part of the task is accomplished lies within their discretion.

3. The lowest level accepts the narrowed *what* of the intermediate level and is free to use skills, experience and intelligence to get their part done in the best way they see fit. Since they are closest to the job and its human and physical factors, the chances are in the over-all management's favor that a well-tailored job done locally will be superior to a standard, rigid *how* developed at headquarters. Headquarters staff, of course, must set the *standards* to be met—both technical and quality—by any innovation that affects other parts of the total job, but as long as they *are* met, individual ingenuity should be allowed to flourish.

Conservatives, gamblers, misers can help in reaching goals

Notice the chance this gives for each person involved to realize a bit more of his self-image. The temperaments of conservatives, radicals, gamblers, misers and adventurers can be brought to the organization's efforts to reach its goals. Its individuals can see their unique contribution and know things would have been different if they *personally* had not been on the job. To know that one's thought, skill and effort would be missed is the fundamental basis of loyalty. (Think what kind of relations and attitudes the inverse of this propostion leads to.)

The most striking example of this to me is Nelson's recalling a dispatch ship on the night before Trafalgar because one of the coxswains had not been able to finish a letter to his wife. The fact that Nelson *knew* about the sailor's plight is astonishing, and when the news of his action swept over the fleet, it is no wonder at all that his men served up a victory to a commander who understood so deeply that loyalty is a two-way street.

When higher levels spell out in extreme detail *how* the objective is to be gained, they both kill the initiative of their subordinates and undermine their self-respect. They also unconsciously take all responsibility for the detailed method's implementation. When something unexpected or unplanned occurs, subordinates are prone to carry out their specific orders even after they have become absurd. It is too risky to do otherwise, because if their alteration, in spite of their efforts, fails to correct the condition, the failure will in all probability be blamed on their nonadherence to the specific instruction. If it *does* succeed, the higher level's judgment of its original method is reinforced. In this kind of game of all blame and no reward, an intelligent man sees the odds against deviation.

At AT&T, the Chairman of the Board, Vice-Chairman, three Executive Vice Presidents and the General Counsel constitute the Executive Policy Committee. This committee's *rapporteur* is the Vice President-Assistant to the Chairman. The Management Sciences Division, which reports to him, furnishes support staff to the Executive Policy Committee.

This committee operates in an associative mode during its planning sessions and meets in a small library adjacent to the Chairman's office. Once a month, this committee moves to a location in an operating company headquarters city—close by an airport—for a one-day meeting with all the presidents of the subsidiary operating companies and the heads of Western Electric and Bell Laboratories. Policy questions on current and future issues are discussed in the associative mode. The output of these meetings becomes inputs to both the Bell System's planning process and to the functional vice presidents at AT&T headquarters.

These functional vice presidents join the Executive Policy Committee biweekly (called the *cabinet meeting*, since each functional vice president heads a staff department of specialists in their disciplines) again in the associative mode for information interchange affecting technical, administrative and policy questions.

From these deliberations among experienced men of diverse backgrounds, expertise and responsibilities, multifaceted information and alternatives for action are examined from the viewpoint of the decisions they must lead to. When a plan is developed for implementation, these associative groups transform themselves into a command structure to carry out a program in which their members' inputs have been considered, accepted, modified or rejected. The control system as to how the decisions are working out is detailed, and results are made available throughout the Bell System, so implementation can be adjusted for current developments or deviations from plan.

In this way, we try to achieve the *harmony of opposites* that arises from memberships in both our hierarchical and associative systems. In each entity below these top echelons, similar processes should operate, as the component parts of decisions are exploded in finer grain to each individual unit.

Associative systems furnish clear channels for advance warning

The associative systems contribute vitality by furnishing clear channels for advance warning of environmental change, strategic options, innovative ideas and suggestions for improvement. The hierarchical system strives for efficient and rapidly responsive management of the daily operations that constitute our central capability. The quality and quantity of operations *in the present* is our primary reason for existence in the minds of our customers, but operations must also constantly absorb technological and managerial innovations from the associative systems if we are to deliver improved operations in all the days of our future. To us, that's what the planning process means, and why we see it as essential to our continued vitality.

Mr. Boettinger is head of AT&T's Management Sciences Division. This article is taken from a lecture he delivered before the British Institute of Management.

The following report on "institutional subordination"—a quiet, deadly, expensive and often unintentional kind of racism—is condensed from a booklet by the U.S. Commission on Civil Rights.

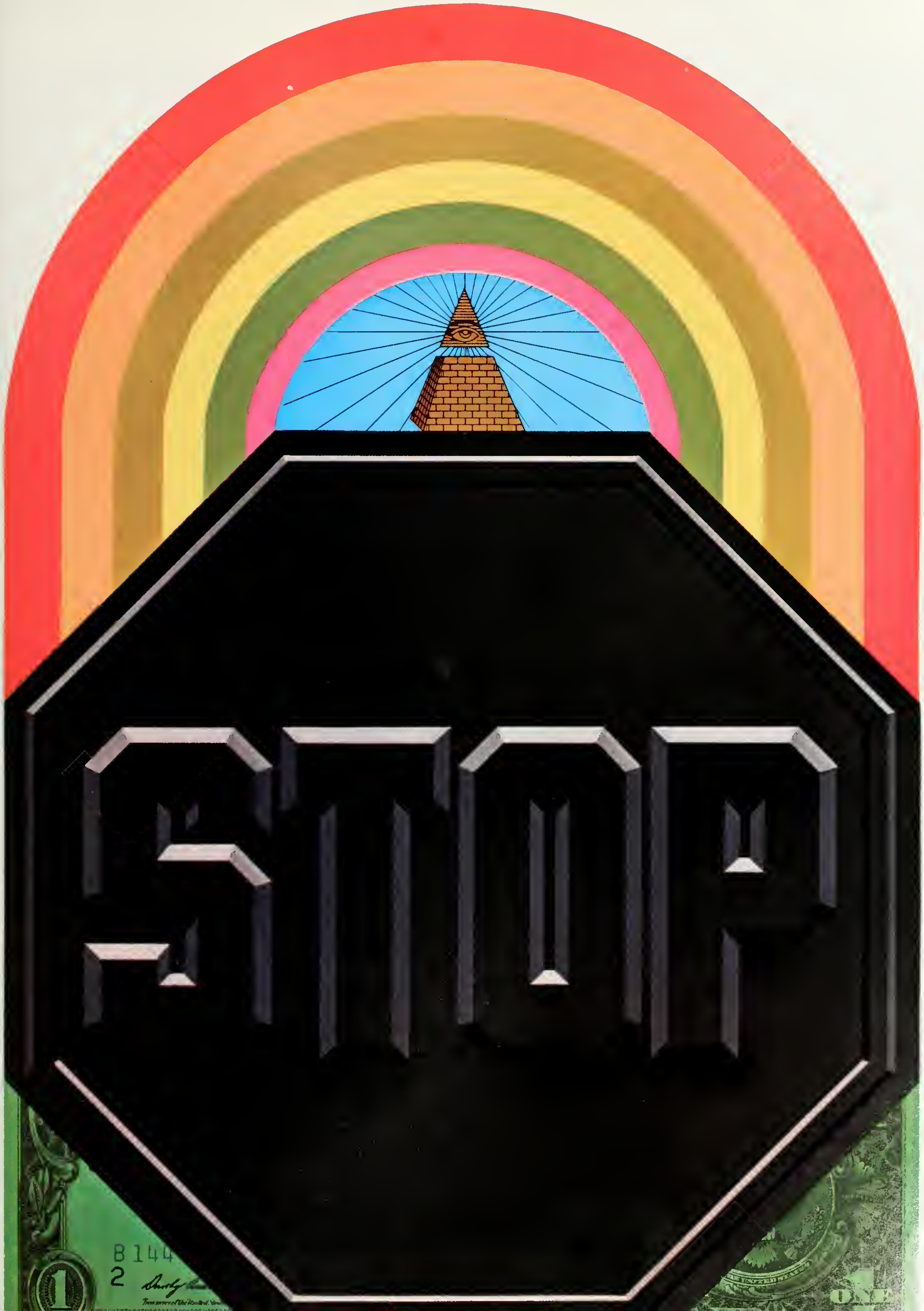
RACISM–IS IT ALIVE AND WELL IN AMERICA?

Racism is one of those words that many people use and feel strongly about but cannot define clearly. Those who suffer from racism usually interpret the word one way while others interpret it quite differently. This ambiguity is possible in part because the word refers to ideas that are very complicated and hard to pin down.

Perhaps the best definition of racism is an operational one. This means that it must be based upon the way people actually behave, rather than upon logical consistency or purely scientific ideas. Therefore, racism may be viewed as any attitude, action or institutional structure which subordinates a person or group because of color. Even though "race" and "color" refer to two different kinds of human characteristics, in America it is the visibility of skin color—and of other physical traits associated with particular colors or groups—that marks individuals as "targets" for subordination by members of the white majority. This is true of Negroes, Puerto Ricans, Mexican Americans, Japanese Americans, Chinese Americans and American Indians. Specifically, white racism subordinates members of all these other groups primarily because they are not white in color, even though some are technically considered to be members of the "white race" and even view themselves as "whites."

As a matter of further explanation, racism is not just a matter of attitudes; actions and institutional structures, especially, can also be forms of racism. An "institutional structure" is any well-established, habitual or widely accepted pattern of action or organizational arrangement, whether formal or informal. For example, the residential segregation of almost all Negroes in large cities is an "institutional structure." So is the widely used practice of denying employment to applicants with any nontraffic police record, because this tends to discriminate unfairly against residents of low-income areas where police normally arrest young men for minor incidents that are routinely overlooked in wealthy suburbs.

Just being aware of someone's color or race, or even taking it into account when making decisions or



2

in other behavior, is not necessarily racist. Racism occurs only when these reactions involve some kind of subordination. Thus, pride in one's black heritage or Irish ancestry is not necessarily racist.

Racism can occur even if the people causing it have no intention of subordinating others because of color, or are totally unaware of doing so. Admittedly, this implication is sure to be extremely controversial. Most Americans believe racism is bad. But how can anyone be "guilty" of doing something bad when he does not realize he is doing it? Racism can be a matter of result rather than intention, because many institutional structures in America, which most whites do not recognize as subordinating others because of color, injure minority group members far more than deliberate racism.

White racism exhibits itself in hundreds of ways in American society and acts in hundreds of other ways that are not recognized by most citizens. Yet all of these can be usefully grouped into two basic categories: *overt racism, and indirect institutional subordination* because of color.

Difficult to define

Overt racism is the use of color per se (or other visible characteristics related to color) as a subordinating factor.

Institutional subordination is placing or keeping persons in a position or status of inferiority by means of attitudes, actions or institutional structures which do not use color itself as the subordinating mechanism, but instead use other mechanisms indirectly related to color. Institutional subordination is particularly difficult to define clearly in a few words. The very essence of institutional subordination is its indirect nature, which often makes it hard to recognize.

For more than 300 years, overt racism was a central part of American life. During these centuries, thousands of overtly racist laws, social institutions, behavior patterns, living conditions, distributions of political power, figures and forms of speech, cultural viewpoints and habits, and even thought patterns continually forced nonwhite Americans into positions of inferiority and subordination. It took the bloodiest of all American wars to abolish the most terrible form of legal subordination—slavery. But many other overtly racist laws and institutions remained in force until well after World War II. These included legally segregated schools, restrictive covenants forbidding nonwhites to live in certain neighborhoods, laws prohibiting interracial marriages, required racial separation of public facilities like bus seats and restaurants, and denial of the right to vote.

Now considered wrong

In the past two decades, there has been important progress in striking down legal support for most of the forms of overt racism. The actual effects of many such forms of racism have been greatly reduced, too. Moreover, this type of conscious and deliberate subordination by color is now considered wrong by most Americans. As a result, many whites believe that overt racism—which is the only form they recognize—is disappearing from America.

Yet hundreds of forms of overt racism remain throughout most of the nation. Examples are the deliberate exclusion of Negroes, Mexican Americans and other nonwhites from labor unions, law firms, school districts, all-white residential neighborhoods, college fraternities and private social clubs.

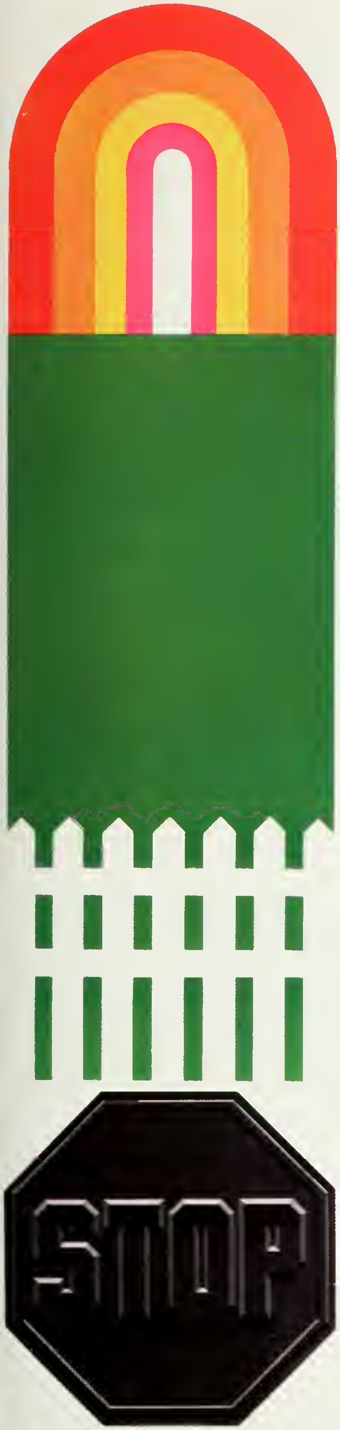
Furthermore, the effects of more than three centuries of overt racism upon both whites and nonwhites cannot be overcome in just a few years. For many generations, millions of Negroes, Mexican Americans, Indians and other nonwhites have been treated as inferiors, given inferior jobs and legal rights, compelled to accept inferior schooling, forced to live in inferior housing and neighborhoods, made to use inferior public facilities and constantly told that they were inferior human beings and had no chance to be otherwise. They have been—and still are—systematically excluded from many residential areas, many schools, many jobs, many social privileges and many political opportunities. This treatment has inescapably had tremendous effects upon a whole range of conditions among nonwhites in America. These conditions include where they live, their incomes, their self-images and degrees of self-confidence, the nature and stability of their families, their attitudes toward authority, their levels of educational and cultural attainment and their occupational skills. Of course, not all members of each nonwhite minority group have been equally affected by these conditions. Yet, taken as a whole, nonwhite Americans are still severely handicapped by the residual effects of past overt racism—plus the many forms of overt racism that still exist.

The deeply embedded effects of overt white racism will not instantly disappear if the white majority suddenly reduces or even eliminates the use of color as an explicit factor in making decisions or influencing its actions. Many whites now say: "All right, we recognize the injustice of overt racism. So we will use other factors which are clearly and reasonably related to the activities and privileges concerned." Examples of these other factors used in making decisions are skill levels in relation to jobs, place of residence in relation to school attendance, ability to score well on entrance examinations in relation to higher education, self-confidence and leadership of whites in relation to job promotions and savings plus present income in relation to buying homes.

Concealed subordination

Usually, the use of such factors is free from overt racism. Hence, it constitutes great progress in relation to most of American history. Thus, most civil rights organizations have argued for years in favor of "merit employment" based upon skill and ability without regard to race or color. And achievement of true "merit employment" regarding hiring, promotion, wages and salaries would be a great advance in most firms. Whites who succeed in this achievement can rightly feel proud of eliminating an important form of overt racism from their behavior.

Nevertheless, even "merit employment" programs can conceal many forms of indirect institutional subordination by color. In fact, we can use the example of such pro-



grams to illustrate how present elimination of overtly racist action does not destroy or even significantly weaken the continuing racist effects of past overtly racist behavior. This can occur because many of those effects are embedded in institutional structures that no longer appear related to race or color.

Neighborhood proximity

Consider an employer who needs workers to fill certain jobs that demand advanced carpentry skills. Naturally, he requires that applicants have such skills in order to be hired. But what if the local carpenters' union excludes all Negroes and Mexican Americans as members? Then this reasonable behavior of the employer has racist effects because of overt racism of another group upon which he relies to carry out his own activities.

Or what if unions accept minority group apprentices specially trained in local high schools, but the only high schools providing such training are in all-white neighborhoods, either too far from minority group neighborhoods for convenient attendance or far enough to be placed in different school districts because all school district boundaries are based upon the "neighborhood promixity" principle? In this case, no decision makers are using overtly racist principles. Yet the result clearly continues systematic subordination of minority groups by excluding them from important economic opportunities.

Returning to the example, assume that the employer saves money by never advertising available job openings. Instead, he relies solely upon word-of-mouth communications from his present employees to their friends to find applicants—but all his present employees are white. This is an extremely widespread practice, since many workers find their jobs by hearing of openings from friends. Yet it has the effect of excluding many minority group members from consideration for available jobs. Because of past overt racism, most whites have mainly white friends, particularly since they live in all-white neighborhoods.

Again, the employer is taking actions which are not overtly racist in either nature or intent—but which nevertheless have racist effects—that is, they subordinate people because of their color. In this case, these effects occur because the seemingly reasonable and "unbiased" behavior of the employer takes place in an institutional context that still contains profoundly racist elements remaining from three centuries of overt racism. If the employer had carefully examined his recruiting practices to see whether he was giving members of all groups an equal chance to compete for his jobs, he might have discovered this situation. But he was not engaging in any overtly racist behavior; so it never occurred to him that his customary practices might have indirect racist effects because of institutional subordination.

This "invisibility" of institutional subordination is even more striking concerning those forms which result from geographic exclusion of minority group members from all-white areas, or perceptual distortion in the way people see reality. Overt racism—both past and present—is the main cause of the special separation of where most whites live from where most nonwhite minorities live. The major form of such racism is deliberate discouragement of Negro and other nonwhite families from buying or renting homes in all-white neighborhoods. Such discouragement is systematically practiced by white realtors, renting agents, landlords and homeowners. This clearly racist behavior has become so well entrenched that many minority group members no longer even try to find homes in all-white areas because they fear they will "get the run-around" or receive hostile treatment from at least some neighbors. So the pattern of exclusion is continued—despite laws and court decisions to the contrary.

Absence of nonwhites

Yet dozens of other forms of institutional subordination are indirectly caused by the absence of nonwhites from white residential areas. For example, most new jobs are being created in suburban shopping centers, industrial parks, new office buildings and schools or universities. But American suburban areas are overwhelmingly white in population. So the suburban sources of

new employment are usually far from where nonwhites live. This makes it very difficult for the latter to know when such job openings exist, to get transportation to look for them and to commute to work once they are found. Even if they do get jobs in the suburbs, they have great difficulty finding housing near their work. This difficulty does not result only from overt racism; it is also caused by zoning laws which deliberately discourage any housing serving relatively lower income groups, or local actions which prevent use of Federal subsidies for such housing. Such laws are usually defended on grounds of "maintaining high community standards" of housing and open space, or protecting the existing residents from tax increases that would be caused by building more schools to serve new low-income residents.

Thousands of acts

All these conditions discourage minority group members from even trying to get suburban jobs. This perpetuates their exclusion from all-white suburban areas. Yet many of the best quality schools, housing developments, recreational facilities and general residential environments are found in the suburbs. So most minority group members find themselves cut off not only from the fastest growing sources of new jobs, but also from many of the best amenities in American society. This is clearly racism or "institutional subordination."

Moreover, this exclusion is accomplished by very few acts of overt racism carried out by a small number of people—supplemented by thousands of acts of indirect institutional subordination carried out by millions of white suburbanites. But most of the latter are completely unaware of the subordinating nature of their behavior. In fact, many sincerely avoid any actions they believe are overtly racist. That is why so many whites become righteously indignant at the claim that American society is "racist." They have carefully purged their own actions of overtly racist behavior, and they sincerely believe their own communities "have no race problems" because there are practically no minority group members there. The institutionally subordinating nature of the processes that cause this exclusion remain completely hidden from them.

This invisibility of institutional subordination occurs in part because minority group members themselves are "invisible" in the normal lives of most white Americans —especially white children. Many white children are brought up in neighborhoods where Negroes, Mexican Americans and other nonwhite persons are totally absent, or constitute an extremely small minority—usually engaged in menial jobs. These children form an unconscious but deeply rooted image of "normal" society as consisting only of white people, and of all nonwhite persons as "strange" and "different" from "normal people."

Other distortions in perception that make whites unconsciously feel "normal" and superior in relation to nonwhite persons have exactly the opposite effects upon the latter. Most nonwhite children also group in neighborhoods where they meet few people not in their own ethnic group. However, they learn from adults who must deal with whites that people in their own group have relatively little power and status in society.

Causes reduced efforts

It is, therefore, not surprising that many members of nonwhite groups unconsciously come to believe that perhaps they really are inferior. Otherwise, how can the pictures of reality which society shows them be explained? But once a person begins to believe he is inferior, he starts losing confidence in his ability to overcome any obstacles he may run into. This often causes him to reduce his efforts when confronted by such obstacles, which in turn produces failures that confirm his feelings of inferiority. So his subordination is not only perpetuated but becomes justified in the eyes of others by his behavior. This, plus geographic exclusion of nonwhites by whites, plus perceptual distortions in white-controlled mass media, combine to produce largely unrecognized psychological and behavioral effects upon both groups. These effects perpetuate the institutional subordination of nonwhites because of their color.

If institutional subordination is one of two basic types of racism, should people who engage in it be considered "racist," even if they do not realize the effects of their actions? How can someone be guilty of racism when he does not realize that his actions have racist effects? After all, guilt is a matter of intention as much as effect.

Actions seem "unbiased"

There are several reasons why it would be both wrong and harmful to consider persons who support institutional subordination as "racists" in the same sense as those who practice overt racism. For one thing, many actions which involve institutional subordination seem perfectly fair, reasonable and "unbiased" to most Americans.

An example is adoption of "merit employment." Accusing people who follow this policy and others like it of being "racists" contradicts common-sense—as well as the long-standing policy of many civil rights groups. Moreover, such accusations might simply infuriate persons who were sincerely trying to eliminate overt racism from their lives. Their outrage at this seemingly unjustified insult might blind them to any understanding of institutional subordination at all.

The proper ways of offsetting institutional subordination may not require changes in the policies of some of the people who cause it. For example, the way to get rid of the subordinating impacts of "merit employment" is certainly not to have all employers put unqualified workers in every job. Rather it is to eliminate unfair union practices or have society as a whole pay for extra training for certain workers.

So what good would it do to make supporters of "merit employment" feel guilty about a policy that was actually producing many benefits, merely because it also produced costs which they, themselves, could not remove anyway? Finally, almost every white American unconsciously supports some form of institutional subordination. Therefore, we might remove nearly all significant meaning from the term —or cause many people to reject the whole analysis—for they know they are not "racists" in the overt sense.

On the other hand, most white Americans are causing impacts upon Negroes, Mexican Americans, Puerto Ricans, Indians and other nonwhite Americans that unfairly subordinate the latter. To this extent, they are all "unintentional racists," even though they are certainly not guilty of the same kind of deliberate injustice as those who practice overt racism.

The principal task of those white Americans combating racism lies within the white community, rather than within nonwhite communities. As pointed out earlier, no policies or programs aimed at improving conditions in black America or among Mexican Americans or other minorities can possibly succeed unless they are politically supported by a majority of whites. Such support is essential to obtain the money and institutional changes required to alter those conditions. Yet that support will not be forthcoming unless most whites significantly revise their present views concerning racism. Many whites, especially those living in suburbs, are almost completely isolated from any direct contacts with life in Negro ghettos or Puerto Rican neighborhoods or other minority group areas. Hence, they fail to perceive the compelling need for further remedial actions there. Moreover, they do not understand how institutional subordination works. Therefore, these whites think the plight of ghetto dwellers is largely their own fault, rather than largely the product of racism expressed by institutions controlled by whites.

White and nonwhite efforts

Only two forces can change this dominant view. The first consists of the dedicated efforts of well informed white leaders within white communities who understand all forms of racism, and why much more must be done to eradicate them. The second is development of greater capabilities and power within the Negro community and other nonwhite communities. By its very nature, this development must occur primarily through the efforts of nonwhite Americans themselves. Once such development begins, it will better demonstrate the true potentialities and abilities of those Americans and give their leaders a stronger bargaining position from which to influence public and private policies. These changes may in turn persuade the white majority to devote more resources to the task of still further developing nonwhite capabilities, both in nonwhite communities and throughout society.

Thus the process of overcoming racism involves a continuous feedback between changing the views of the white majority and expanding the capabilities and power of nonwhite communities. It is clear that the most critical role in this process for whites fighting racism is influencing the opinions of other whites. Similarly, the most critical role for nonwhites is developing their own communities.

A worthy objective

This conclusion certainly does not imply that no whites should work in nonwhite areas, or vice versa. In fact, such joint action is one of the basic strategies for combating racism. But the predominant efforts of whites in this combat should nevertheless involve those strategies focused upon the white community itself. For no one else can carry out those strategies—yet without them, the entire struggle is doomed.

Opposing racism is indeed a worthy objective for all Americans. It is the highest tradition of democracy to promote equality of opportunity and freedom of choice for all citizens in fact as well as in theory. But such equality and freedom cannot exist as long as racism continues to operate through long-established and pervasive institutional structures and behavior patterns. No other single issue in domestic affairs has more profound implications regarding America's success in achieving its own ideals or the kinds of social changes that must be carried out to attain them.

The foregoing article was excerpted from the booklet, Racism in America, *published by the United States Commission On Civil Rights in January 1970. The publication in its entirety can be purchased for 50 cents from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.*

A Warm Medium of Communication

Picturephone® service and progress in a Pittsburgh ghetto school

by Omar Khayyam Moore

Almost anyone can see that Picturephone® service eventually will serve as a first-rate convenience to business. Why fly across the continent to a meeting if you can talk to an individual or group face-to-face by picking up the phone? Why carry a sample to a customer if you can show it to him without moving from your desk? The role of Picturephone service in business is straightforward—in time it will be a universal service on a par with the telephone.

The potential role of the Picturephone set in education is not so obvious, *but it definitely is an educational necessity.*

Picturephone service's potential is being demonstrated daily at Letsche Elementary School, a ghetto school on the edge of Pittsburgh's central business district, which was torn by riots three years ago. In this school, where I am director of an educational laboratory program, we are employing Picturephone service as a supervisory tool to guarantee the quality of the innovative educational techniques we're using.

It is in the realm of supervision —an area largely unexplored compared to the area of information retrieval from resource centers—that

the Picturephone set may find its most fruitful application in the educational field.

When considering anything that amounts to a genuine educational innovation, we must recognize that new attitudes and skills are required of the users. This is especially true where complex technology is an essential part of the innovation as it is at Letsche.

The further an innovation is extended beyond initial development, and beyond where presumably it was well understood, the more likely it will be degraded in the direction of customary educational practice. Unless those who created the innovation supervise its propagation, the chance of duplicating its initial successes is lowered.

We must recognize that educational procedures are at least as complex as those of a manufacturing process, the making of steel, for example. No one would think of running a steel mill without proper supervision, yet the whole concept of quality control over learning processes is virtually nonexistent in schools. True, there is some educational testing, but this is after the fact, a far cry from monitoring learning as it occurs.

Picturephone service solves this problem. It makes possible real-time supervision of continuing educational practices. It permits a highly trained staff of supervisors to interact directly with both students and teachers as learning takes place. A mobile Picturephone set, assuming jacks have been installed at appropriate locations, can be taken from room to room throughout a school. If a suitable sampling design is followed, supervisors can obtain a clear picture of what is happening throughout a school system and on this basis take remedial steps at once.

Since both parties to a conversation have the same controls, Picturephone service is an equitable device. It is by no means merely an instrument for surveillance. It permits students and teachers to engage in mutual conversation with supervisors. This two-way conversation permits good ideas to be passed upward as well as downward —immediately.

And, too, the service is a reflexive medium of communication. Each set has a button that permits the user to see himself as he is seen by the other. What is equally important is that this self-viewing capability can be used without disturbing the person at the other end of the line. This means that for the first time human beings can monitor their own interactional behavior as they interact. They can watch their own facial expressions and gestures. They can see themselves as others see them. Thus, Picturephone service adds a new dimension to the presentation of oneself in everyday life. Many of us may be in for some surprises. Perhaps we do not project the considerate image that we attribute to ourselves. Hopefully, self-awareness will lead to more humane interpersonal relations. Supervisory activities tend to be somewhat harsh and unpalatable, but maybe this will change.

Unprecedented opportunities

Because of its reflexive properties, Picturephone service offers unprecedented research opportunities for studying people's sense of self-esteem and the nature of their self images. This has been an extremely difficult area to investigate. The outcome of such studies should be of great value to the educator.

But, most important I think, Picturephone service is a warm medium of communication, especially for children. It is simple enough for a kindergartner to operate. Unlike television, which talks *at* them, the Picturephone set talks *with* them. Adults, who tower over children in person, are miniaturized on a Picturephone set. Some three-year-olds have asked how their teacher got into the set.

Besides accommodating interaction, Picturephone service also can be used to call an information resource center for carefully prepared audio-visual materials. The practical value of such a center is that it is economical. Each school need not have its own equipment, materials and operators.

An educational tool with such capabilities can perform what laymen might consider "educational miracles." This is being demonstrated in the laboratory program at Letsche—a most unpromising testing ground. The building, itself, is drab and forbidding, situated across the street from a trash-covered lot, yet in full view of Pittsburgh's famed Golden Triangle business district. A few blocks away is the exclusive Washington Plaza apartment complex. The contrast between wealth and abject poverty is striking, but it is not surprising that the Letsche students are almost all poor and black.

After Letsche students complete the sixth grade, they attend a high school in the same area. This high school is an academic disaster. About one-third of the students there drop out, and most of the remaining two-thirds are academically behind their age group in suburbia by three to four years.

Some would attribute the poor performance of ghetto students to genetic inferiority, social and economic deprivation or subtle deficiencies in Afro-American culture. These people ought to take a good look at the present classes at Letsche, nursery through first grade, before making up their mind about the inherent achievement potential of ghetto students. The children in the educational laboratory are a living demonstration of the capacity to achieve by those who ordinarily are doomed to failure.

The laboratory, itself, situated in the basement of Letsche, constitutes another striking contrast. It is bright and attractive and contains the most modern educational equipment. Its staff, too, is extraordinary, consisting of competent, highly motivated black paraprofessionals drawn from the neighborhood.

Each child in nursery, kindergarten and first grade—80 in all—has a half-hour lab session every school day. Each session is tailored to the individual child. When a child comes into the laboratory, and this is a voluntary matter, he goes to one of seven learning booths. Each booth has special equipment programmed for the student in light of what he did the day before.

What do the children learn? They learn basic intellectual skills as a set of interrelated activities. They learn to read well, with some first graders reading as high as fourth-grade level. They learn to type so expertly that it embarrasses less facile students. They learn to listen more attentively by taking dictation on a recorder-reproducer, as does a secretary. They learn about numbers by exploring this mysterious domain with the aid of a special-purpose computer. In short, they enjoy themselves in school.

Real-time supervision

The operation of the Letsche laboratory is an intricate process, because an advanced educational technology laboratory, properly run, is at least as complex as a sophisticated manufacturing plant. And the practical requirements of everyday operations—of an educational technology laboratory or a manufacturing plant—demands close-up, real-time supervision. It is this reality that makes Picturephone service an absolute educational necessity—it provides the supervisory linkage.

This year 200 children will use the Letsche laboratory, and the program will extend through the second grade. Beginning some time this year it will include the third grade. Altogether there will be four of these educational laboratories in Pittsburgh by the middle of this year—all linked together by Picturephone service.

It is Picturephone service, alone, that is enabling us to expand our system of innovative educational laboratories. It will give us the ability to closely control the quality of education in all locations and should allow us to achieve the same gratifying results as at Letsche.

I think it is safe to say that Picturephone service is providing education with the key to its own future.

Dr. Moore is Professor of Social Psychology at the University of Pittsburgh, where he is director of the Clarifying Environments Laboratory in the Learning Research and Development Center. He is also director of the Pittsburgh Model Cities Education Project.

A Lesson in Leadership

(Continued from inside front cover)

"The true test of a great man—that, at least, which must secure his place among the highest order of great men—is his having been in advance of his age," said historian Henry Peter Brougham. Mr. Brougham happened to be a Scot. That fact notwithstanding, it must be said that seldom has the son of a Norwegian baker from Stoughton, Wis., been better described. Being "in advance of his age" is one of the qualities that clearly impressed the 250 businessmen, educators, journalists and others who in January of this year voted Hi Romnes "Businessman of the Year" in the *Saturday Review of Literature*'s annual poll. One could bet with some certainty that, while grateful, he shrugged off that honor much as he does other high praise. For Hi Romnes is, if anything, a genuinely and thoroughly modest man.

But the correspondent who covered that story knew his onions. He said the winning candidate is not chosen "entirely on proficient administering of a man's own business," although Hi Romnes's productive administration of this business during a period of unparalleled stress certainly did nothing to diminish his chances for the award. At least equally important was what the magazine called, "a candidate's service to public interest projects, education, government and broadly based civic pursuits with special emphasis on current social problems." Said the *Saturday Review*: "In this regard, Romnes was a decade ahead of many businessmen when in 1961 at Little Rock he said '. . . prejudice breeds waste, the most tragic kind of waste, the waste of human resources. But in the final analysis there is one reason above all others for giving our best management attention to making equal opportunity come true—and that is *because it is right*.' "

The magazine mentioned that the Romnes record on equal opportunity goes back well beyond 1961. It also cited some concrete initiatives he once suggested to businessmen in Baltimore—back before most businessmen thought much about such things—on how they might add more nonwhites to industrial payrolls. That talk, too, became a benchmark to industry and government leaders. After he had urged people "of good sense and goodwill" to involve themselves in helping "redress the effects of generations of economic, social and educational deprivation," through such activities as increased vocational training and innovative placement procedures, he told them why he felt it was necessary: ". . . for proving to the world as well as to the disadvantaged in our own country that America is the land of opportunity, *not for some of us but for all of us*."

If Hi Romnes has long been considered by others to be in the forefront of business thinkers and doers, there was a time when he himself was not so sure of his prospects. "I was an E-level person for about 18 years, and there were plenty of times I never expected to go any higher," he says. "Of course, we had the Depression and then World War II, and nothing, including most people, moved very much during that time."

There was another brief period when he harbored the sort of self-doubt that most mortal men feel from time to time. "The War was over, and I was lucky to be just about the right age they were looking for to fill some of the needed jobs. In 1949 I was plant extension engineer here at AT&T. That was a section head job, and I really enjoyed it. Then I was suddenly demoted and sent out to Illinois as building and equipment engineer. After a while I asked my boss what I'd done wrong and he said just to sit tight, so I did, and in a couple of months I was promoted to chief engineer at Illinois Bell."

When Hi Romnes finally started moving in the business, he did so with alacrity. Luck, despite his claim to the contrary, appeared to have had little to do with his progress. More instrumental were key assignments on two vital postwar projects, and his performance on those projects. One of them involved planning a network of microwave facilities and frequencies for the nation, and the other involved the planning and introduction of nationwide dialing. "I was just a low-level guy, but working on those committees I got to know a lot of important people in the business. These were very important projects and top management was focused on what we were doing. The projects both turned out to be successful, and partly as a result of those experiences I moved pretty rapidly up the line in management from about 1945 to 1952."

It's impossible to pin the chairman down as to his favorite job, because, in his words, "I loved every job I ever had. There never was a job I didn't honestly hate to leave. I worked just as hard, and enjoyed it just as much working on K carrier and coaxial cable as an engineer in 1935 as I do on the job I've got now. I can say the same thing about every one of them, all the way up and down the line."

Because he is a quiet and humble man, one wonders if the employee, share owner and public bodies out there will ever really know what a determined leader AT&T has had during the years Hi Romnes served the System as its chief executive officer. For he has answered not with flamboyance but in reassuring and reasoned ways to the long-haul needs of this enterprise. He has worked to develop a decision making process that will serve this business well in the years to come. And he has strengthened materially the long-range planning and organizational capabilities of the Bell System.

It is sometimes said that the most important measure of a business leader is in the groundwork he lays for the future of his firm. If that criterion be true, this leader must be measured as standing very tall indeed. He has given the Bell System the suppleness it will need for the times of change ahead, the strength it will need to fulfill its opportunities for greatness.

American Telephone and Telegraph Company
195 Broadway, New York, N.Y. 10007

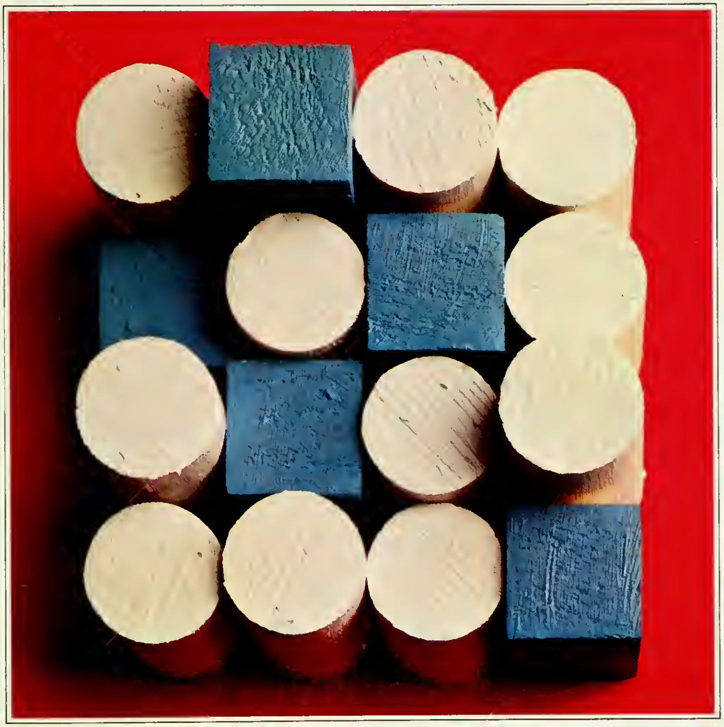
Moving? Please inform the *BTM* circulation coordinator in your Bell Company's Public Relations Department. **Please include the mailing label from this issue.**

Printed in U.S.A.

Bell
TELEPHONE MAGAZINE

MAY-JUNE 1972

KANSAS CITY, MO.
PUBLIC LIBRARY
MAY 30 1972



Bell
TELEPHONE MAGAZINE

VOLUME 51 NUMBER 3 MAY/JUNE 1972

2 **Government and Business: Working In Concert Toward Common Goals**
An examination of the positive interaction between Federal, state and local government and American business.

7 **Child Care and the Bell System**
Developed to reduce high employee turnover, the Bell System's pioneering day care program is one year old.

14 **Optical Fibers: Cable for the Laser**
Tiny glass fibers may provide the transmission system of the future.

16 **The Better to Serve—Part II**
By Dr. Harry A. Shoemaker
An in-depth look at current training around the Bell System and how it can be improved.

22 **Manpower Needs and the Urban Schools**
By G. T. Bowden
How does the current plight of urban education relate to the Bell System?

30 **Communications for a Super City**
A glimpse into 21st century telecommunications as Houston plans to enlarge its Central Business District.

John D. deButts
Chairman of the Board
Robert D. Lilley
President
William L. Lindholm
Vice Chairman
Frank A. Hutson, Jr.
Secretary
John J. Scanlon
Treasurer

Tim H. Henney
Editor
Al Catalano
Art Director
Donald R. Woodford
Managing Editor
Thomas J. Fay
Associate Editor
William P. Kuhs
Associate Editor

Published by
American Telephone
and Telegraph Company
195 Broadway,
New York, N.Y. 10007
212 393-8255

Business and Government

WORKING IN CONCERT TOWARD COMMON GOALS

When a telephone company employee was dispatched to the airport to meet H. I. Romnes on one of his frequent trips to Washington, D.C., he was surprised to learn that Mr. Romnes' destination was none of the traditional haunts of the traveling businessman.

The former AT&T president and board chairman was not bound for the F.C.C., Department of Commerce or any other business or regulatory agency. His destination was the United States Supreme Court.

No litigation was pending against him there, and none affecting the Bell System was before the Court. Romnes was serving as an expert witness of sorts, however. He was one of several businessmen from the Business Council, to whom the high Court's jurists had turned for a review of their operations and for recommendations on modernizing and streamlining the Court's business procedures.

Such involvement hints at the high esteem accorded Bell System management outside the System. More significantly, it demonstrates the interdependent relationship that has evolved between government and business over the years.

So intertwined have the public and private sectors become that there is hardly an act by a major business—regulated or otherwise—that does not affect government. Conversely, there is hardly a major governmental decree these days that does not affect more and more large businesses.

Consider, for example, the impact of the growth of the automotive industry upon the public payrolls. One out of every 10 local and state employees works in a vast and complicated governmental network organized to manage the automobile. Now consider the potential impact upon employment that Federal and state laws to reduce auto emissions and tighten safety regulations will have. The increase in jobs may be substantial as bureaucracy after bureaucracy springs into existence.

Government has been involved in the telephone business since the day in 1876 when Alexander Graham Bell filed his first patent. Government actions have affected the communications industry adversely on some occasions, and benefited it on others. They have helped shape its decisions—and helped decide the shape of the business.

The Long Lines department, for example, was launched as an operating company essentially because a conservative Massachusetts legislature would not allow a business to capitalize at more than $1 million. This was not enough to start the nationwide telephone network Theodore Vail envisioned, and so AT&T moved to New York.

That was in 1885. The telephone business, as most businesses, was a small enterprise at the time. In the ensuing years, as the business grew, governmental involvement in the business also grew.

Today there is hardly a major activity conducted in the Bell System that does not come under the scrutiny of some governmental unit—pricing, sales, purchasing, financing, expenditures, taxes, personnel practices, wages and hours, pensions. Cite an activity and you likely

will find that the government is interested in how the Bell System is carrying it out.

Big companies also affect their environment on a larger scale. They attract large numbers of employees and this requires that the community provide more schools, housing, roads, public transportation, health care and other services. Often they cause or contribute to air and water pollution. Such external effects of doing business present problems that business and government today are working in tandem to resolve.

Recently retired AT&T president and board chairman H. I. Romnes expressed that working relationship in these terms:

"In recent years, we in the United States have evolved—in the pragmatic fashion of Americans—a new amalgam of public and private efforts, which we apply in constantly varying combinations to the direction of our affairs and the solution of our problems. It conforms to no ideology or dogma. It is uniquely American.

"This interpenetration of the public and private sectors and the increasing cooperation between business people and government people it involves, have served to develop a better understanding of the role of enterprise in our society and an increasing respect for the creative capacities of business . . ."

A prudent involvement

Other major corporate leaders feel similarly. Former IBM president Thomas Watson put it this way:

"Much as we may dislike it, I think we've got to realize that in our kind of society there are times when government has to step in and help people with some of their more difficult problems. Programs which assist Americans by reducing the hazards of a free market system without damaging the system itself are necessary to its survival."

Showing that he was paying more than lip service to the validity of prudent governmental involvement, Watson added:

"My own company became involved with the antitrust division in 1952 and we now operate under a consent decree. It never seemed to me that this action gave me the grounds to criticize the government. In fact, I have frequently stated that I believed the law was a force for good and I have no quarrel with the decision in relation to IBM."

These views are shared by an increasing number of businessmen. But while they see the necessity of governmental intervention in some areas, they are not by a long shot saying they favor governmental interference. They are simply saying that large businesses have enormous power, that this power was granted to them by the public, and that business must show that it is acting responsibly in using it.

Built military network

Arthur Page, AT&T's first vice president of public relations, noted more than 30 years ago that, "large size calls for behavior that is wiser and more scrupulous and responsible than is permitted in the obscurity of littleness.

". . . It is not enough to be innocent of bad intentions," Page admonished. "It is necessary to foresee situations so that no innocent act may be misinterperted by anybody."

What Page asked, of course, is impossible, and he knew it. One hundred per cent success would be unattainable. But he had set a good goal for Bell System people. The relationship between the Bell System and the government ultimately depends upon how well telephone people perform their jobs, and the image they convey in that performance. Each employee must become aware that there is hardly a job in the Bell System that does not affect the operation of government or one that isn't affected in some way by governmental action.

A prime example of this impact and interaction is the AUTOVON worldwide military network. Construction and servicing of AUTOVON has touched upon every department in Long Lines, the associated companies and some independent companies. AUTOVON has had a great impact upon personnel assignments, revenues, rate requests and even relations with the F.C.C. As early as 1965 it generated the need to automate Long Lines' service order system and compile data banks on the circuits and trunks and the engineering needs of the network. And because it is a dedicated network of special features, AUTOVON has presented the Bell Laboratories with numerous challenges and unique demands.

A major challenge involving the entire Bell System was the installation of AUTOVON's Multiple Level Precedence Pre-Emption arrangement, undertaken in March, 1966, approximately two years after the SCAN and NORAD/ADC networks were merged into the military network. MLPP is a "survivability" feature requested by the military to assure completion of essential calls. Under this arrangement, military officials are assigned precedence ratings which allow them to override less important calls when all remaining circuits are busy. Its installation involved the herculean task of modifying or replacing every piece of equipment in the network while maintaining service. The plant, sales, traffic, engineering—every department in every Bell System operating unit—was involved to some degree in this effort.

More sophisticated equipment

But the magnitude of the demands AUTOVON places upon Long Lines, the Bell System and independent companies is best envisioned when one considers that during the past three years it has taken two major cutovers per year—each requiring two years of planning—to install the 69 switching centers now serving the network. Because these cutovers required the rearrangement of the entire network, a staggering number of service orders—about one for each of the network's 16,000 access lines and 8,500 trunks—was generated. The volume was far too large to handle manually, leading Long Lines to take continuing steps toward more sophisticated automation of service order procedures.

Additionally, Long Lines established an automated data base in an effort to pin-point the location of the thousands of circuits in the network, and its traffic engineering department has implemented several computer programs for determining the number of trunks needed between switches and to analyze the network's grade of service.

AUTOVON's impact has been upon people as well as machinery, however. Hundreds of Bell System people work at jobs in day-to-day servicing of the network. In Washington, D.C., alone, some 130 persons hold such positions. Hundreds of other Long Lines employees work at the 69 AUTOVON switching centers where the work forces average from 10 to 50 persons. Other employees work at the Dranesville, Va., management network control center.

Substantial financial investment

There are hundreds of other examples—some of them less dramatic—of government's impact upon the company. An obvious one is the millions of dollars in local, state and Federal taxes Bell System companies collect. While some may consider tax collection an unnecessary burden, it is a minor irritation compared with the financial costs some other governmental actions unintentionally cause the Bell System.

During any given year, for example, the cost of relocating plant equipment to accommodate governmental projects can cost a Bell System company hundreds of thousands or even millions of dollars. The Chesapeake and Potomac Company of Virginia alone spent $1.3 million on such "non-betterment" costs during the fiscal year ending June 30, 1971. Fortunately, the company operates in one of the 29 states where utilities can be at least partially compensated by the state for such expenses. C&P recovered $850,000.

At the Federal level, the System is still evaluating the probable impact of the 1970 Occupational Safety and Health Standards Act. No one doubts that it will be extensive. AT&T and each operating company have assigned coordinators to see that proper steps are taken to meet the reporting and safety requirements of the measure.

As an example, take the proposed regulation requiring that all hand rails be placed three inches from the wall. The present Bell System standard is for a one and one-half inch clearance. Changes in hand rails alone would cost the associated companies hundreds of thousands of dollars. Another proposed regulation would require that all towers be constructed with platforms at certain intervals. Long Lines has not constructed towers with platforms for several years. Meeting this requirement would cost millions of dollars.

Next, there is a proposal that safety records be kept at every establishment. Interpreted literally, this would mean that separate records on employee accidents be maintained at every location where a Bell System employee is stationed.

At this point, Bell System officials are meeting with officials of the Occupational Safety and Health Administration of the Department of Labor in an attempt to get clarification of these suggested regulations or reach some compromise on matters that would be costly to the System while not improving safety conditions appreciably.

Because it parallels the government somewhat in organizational structure, the Bell System also is constantly being asked by Federal agencies to assist them in evaluating or in running their operations. Last year the General Accounting Office asked AT&T for help in determining the best data communications system. G.A.O. wanted to know whether data and communications management should be centralized or dispersed among various locations. Representatives of Long Lines and AT&T's Business Information Systems division worked on the project and made a sound recommendation.

Reorganized the Mint

A more imposing request was contained in a letter the Federal Relations division of AT&T received last year from Eugene T. Rossides, Assistant Secretary of the Treasury for Enforcement and Operations. The Office of Management and Organizations was undertaking a comprehensive review of the Bureau of the Mint at the time and Rossides said it needed the "counsel of someone with expert knowledge of modern plant management and operations, including production planning, scheduling control, quality control and materials handling."

"The Western Electric company has a fine reputation in this area," Rossides wrote, "and we hope that we will be able to get them to assist us in a technical advisory capacity."

Talent as well as material

Western Electric not only could but did conduct an in-depth study of the Mint. Last November, Rossides wrote to former Western president Harvey Mehlhouse that the Treasury Department was "so impressed with the results of the first effort—evaluation of the mechanical operations at the Philadelphia Mint—that we are proceeding to implement their recommendations without awaiting the completion of the overall study."

Over the years, Bell System people have served the government in a variety of critical assignments.

—As head of the President's Commission on Postal Organization, former AT&T Chairman Frederick R. Kappel led a team that drafted the blueprint for the subsequent reorganization of the Post Office Department. In December, Mr. Kappel was named chairman of the board of the new, reorganized United States Postal Service.

—Dr. Edward E. David, Jr., former executive director of the communications principles division of Bell Telephone Laboratories, is presently serving full-time as President Nixon's science advisor.

—President Jerry Hull of the Pacific Telephone & Telegraph Company is currently serving the National Alliance of Businessmen as a regional executive director. The NAB, whose mission is to find jobs for returning Viet Nam veterans and other "underemployed" people, has also been led by such Bell System officers as James R. Cook, former president of the Illinois company, William M. Day, former president of Michigan Bell and J. Hillman Zahn, public relations vice president for the Chesapeake and Potomac Companies in Washington, D.C.

—AT&T managers Dan M. Davis of Personnel and James S. Cline of Information have both served stints with the government. Davis was communications director for Plans for Progress, a voluntary effort to encourage equal opportunity employment. Cline was assistant to former Postmaster General Winton Blount. They are representative of many such people throughout the System who have interrupted their careers to help the government achieve an essential objective.

"Sandwich-type" dime

Back in 1964 the Senate Finance Committee, worried about the scarcity of silver, instituted hearings into the feasibility of reducing the silver content of U.S. coins. The outcome of the hearings naturally concerned the $4 billion vending machine business. That industry stood to lose millions of dollars if the new coins proved incompatible with its machines. The Bell System, however, could not only foresee problems with public telephones in service, but with a new model just coming off the drawing boards. Bell Laboratories had recently completed design of a single-slot public telephone that would reject anything but nickels, silver dimes and quarters.

The Laboratories quickly assigned a three-man team to develop a coin that would behave similar to a silver alloy coin. The results of their labor was a laminated or "sandwich-type" process using a copper core and two outer layers. Four combinations for coins with silver contents ranging from zero to 70 per cent, but all having the correct electrical properties for vending devices use, were devised and sent to the Batelle Memorial Institute, Columbus, Ohio. The government had chosen Batelle to investigate the possibility of developing new coins and to evaluate industry proposals. Batelle recommended the sandwich type coin developed at the laboratories, and the standards for the new pieces developed at the Laboratories and were made a part of the United States Coin Act of 1965.

As a result of this cooperative venture, the Bell System was not only able to introduce the single-slot telephone without modification, but the government saved millions of dollars by making coins for far less than their prior cost. The cost of manufacturing quarters, for example, dropped from 23 to 2 cents each.

An often overlooked dimension of the Bell/Government relationship is the cooperation government departments extend the System in such public interest projects as moving men and materials to disaster scenes. In the aftermath of hurricane Camille, for example, the Air Force airlifted 129 men and 126 trucks from Bell of Pennsylvania, Diamond State, New Jersey, Indiana, Ohio and Illinois Bell Telephone Companies into the Gulf Coast area served by South Central Bell. The Bell System used the Air Force cargo planes and pilots because there were no commercial planes large enough to transport the 5,000-pound telephone vehicles. In such cases the Bell System does not receive Federal assistance free. The government is reimbursed at the going commercial rate.

Serve as tax collectors

The foregoing are but a few of the countless ways the Bell System and various units of government interact one with the other. Many veteran telephone employees could add to this list *ad infinitum*, from personal experience.

It might prove equally interesting to briefly review the effect governmental actions have upon this business at a departmental level—say the commercial department—on an almost daily basis. We have noted the local, state and Federal excise taxes commercial people collect on a routine basis. In Manhattan alone, such levies total $8 to $9 million per month. During 1971 the Bell System, including Southern New England and Cincinnati Bell, nationwide collected approximately $1.3 billion in Federal excise taxes.

Another example: In New York State, the commercial department of the New York Telephone Company incurred an additional printing bill when the state decided that the company no longer could hold unreturnable deposits for the customary six years and then release them to the state. Under a new regulation, the company once each year must list all of the deposits classified as unreturnable in the local newspapers. This has meant an additional cost to New York Telephone because of the man-hours now devoted to checking the authenticity of claims.

There are many other ways in which governmental action influences the conduct and course of the nation's businesses.

—Various governmental units such as the Federal Bureau of Investigation, the Internal Revenue Service, the Treasury Department and state and local police departments subpoena the records of some customers during the course of investigations or litigations.

—When telephonic equipment is confiscated by law enforcement agencies during raids upon premises where unlawful acts allegedly have occurred, Bell commercial people are prohibited by law from resuming service until given an official clearance.

—In various states, the commercial department must have official approval from the department of welfare before providing telephone service for relief recipients.

—The business becomes involved in the governmental process when company attorneys seek judgments against telephone customers who have defaulted in payments.

—In larger cities, commercial departments must have specialized units in their general accounting offices devoted exclusively to handling the service and billing of governmental agencies.

A similar profile of the impact of government upon Bell System operations could be done for each department. But these and previously cited examples give graphic proof that government does play an integral part in the management of the telephone business. And vice versa.

H. I. Romnes put it this way:

"Only by . . . face-to-face dialogue can we overcome the stereotypes that stand in the way of business-government understanding. For if we in business can say of the bureaucrat or politician that 'he never met a payroll,' it can also be said with equal justice of most of us that 'we never carried a precinct.' We have a lot to learn from each other."

CHILD CARE AND THE BELL SYSTEM

CHILD CARE AND THE BELL SYSTEM

In April, child care in the Bell System was one year old but still an infant in more ways than time. While much has been learned about the operation of child or day care facilities, even more is still to be learned. The impact of child care upon the business is still unknown and its future uncertain. Hope and optimism, however, are high.

"About all we can determine at this time is whether day care services will help reduce absenteeism," says Charles Sherrard, AT&T project manager in the department of environmental research and development. "We can do that by comparing the records of female employees with children enrolled in the programs against various control groups of employees.

"But the major questions that must be answered are still unanswerable because of a lack of hard data," says Sherrard.

One of those questions is whether or not child care will help the company recruit and retain qualified female employees. Another is what type of child care service, if any, the company should provide.

The first question cannot be answered until the economy recovers and AT&T's turnover rate returns nearer to normal.

The answer to the second question will be based upon "hard data" that AT&T hopes to gather from experimental day care projects now operating in Washington, D.C., Columbus, Ohio, and Chicago, Ill.

The first two projects are community-based child care centers. One is being sponsored by the Chesapeake and Potomac Telephone Company in Washington, D.C. The other is a joint undertaking between Ohio Bell and Western Electric. The third venture is an experiment with foster child care homes Illinois Bell has under way in Chicago.

The absence of hard data about child care is difficult to understand, considering that it has been known in some form in Europe since the 1840's. Both Germany and Russia had what were termed "day nurseries" as early as 1848. Later the idea spread to France, England and the Scandinavian countries. In the western hemisphere, Brazil probably has had the most experience in the field. For some years, that country has required employers of a specified number of workers to provide child care services for the workers' children.

The first industry-related child care center established in the United States is believed to have been the King Edward Nursery, set up by John Swisher and Son, Inc., Jacksonville, Fla., in 1939. It served approximately 75 children ranging from ages 14 months to 6 years until its closing in 1967 because of fire regulations.

Industry involvement in child care reached its height during World War II. In 1943 Congress passed the Lanham Act, authorizing $51 million in funds for 3,000 local child care centers in areas with critical labor shortages and a need to attract females into the work force. Some companies, such as the Kaiser Company, established their own child care centers. Nearly all of these, however, were abandoned after the war. Most firms considered them too expensive, paternalistic or old-fashioned. Too, the prevailing sentiment in the nation was that working wives should return home and try and restore the family stability the war had disrupted.

Thus, when two years ago a study of force loss prompted the Bell System to look to child care facilities as a means of reducing turnover, few facts were available.

"What cost data were available often did not include capital investment for the facilities," says Sher-

rard, "or some costs were hidden. In many cases, the centers were not in the city or did not have a strong educational program for pre-schoolers. Nor were tracking data available on reduction of absenteeism or force losses. Also, no control groups for research had been established."

After visiting various centers set up by industries, educational institutions, unions and foundations, department of environmental research and development people and behavioral scientists at Bell Laboratories held a series of meetings with outside experts in child development at the Labs' Murray Hill, N.J., facility.

"The meetings provided us with some idea of how complex the subject of early child development is and how little is really known about it," says Sherrard. "But we did get a clearer picture of what a center should or should not be."

In their report on the eight seminars, the Bell Laboratories scientists concluded that "no specific theory of child development seems to be the best," and the Bell System pilot child care programs would serve as an "excellent context in which to study the relative effectiveness of different approaches."

Meanwhile, a study of governmental regulations covering child care centers uncovered a maze. Nearly all states were found to have laws and regulations that countered expansion of industry-related child care centers.

But the documented need for day care in the Bell System appeared to outweigh the governmental red tape. In one city, a survey showed approximately 130 telephone operators quit each year because of child care problems, and another 800 qualified female applicants could not accept job offers for similar reasons. A close examination of exit interviews with women who said they were leaving the company because of "home duties"—24 to 28 per cent of all female resignees—also showed that a substantial number left because of inadequate child care. Many of these women complained they were paying from $11 to $25 per week for poor baby-sitting.

Illinois Bell Telephone Company found that at least 250 of its female employees from all departments quit in 1969 because of child care problems. Furthermore, the company's study showed that three out of four mothers needed care for children under 2½ years of age, below the normally acceptable child care age limit for centers.

Governmental figures on the rising number of female workers also seems to support a need for day care facilities. Between 1940 and 1970, the number of working mothers rose from 9 to 42 per cent of all working women. Presently one-third—or 4.2 million—of all women with children 6 years of age or younger are employed. The government estimates that during the next 15 years, another 2.4 million mothers of preschoolers will enter the labor market.

With this need in mind, the Chesapeake and Potomac Company opened the doors of the Bell System's first child care center on April 1, 1970, in Washington, D.C. The center is situated in a converted supermarket in the southeast section of the city, known as Anacostia.

Community Learning Center, Inc., the child care firm hired to operate the center, chose the site after a C&P survey showed that the largest concentration of the company's telephone operators with children in the eligible age range resided in Anacostia. The center was designed to accommodate 100 children, but until September, when 20 more children were enrolled, it had only 30 enrollees. Now there are 60. The attractive and modernistic facility was designed by Margaret Skutch, a vice president of the C.L.C. and an expert on early child development. Mrs. Skutch, who also designed the center's curriculum, built the interior on different levels, calling each a "learning station."

At various periods during the day, the children are taught arithmetic, reading, language and art and are given training in sensory skills. They also are assisted in developing their ability to deal with adults and peers and becoming self-sufficient within their own capabilities. The center's staff consists of a director, an assistant director, one teacher for every 10 children and several teachers' aides. Staff hours are staggered to keep the center open from 6:30 a.m. to 6:45 p.m.

Enrollments are processed by Jane Baldwin, personnel supervisor at C&P who is in charge of the program, and an assistant. They brief parents on operation of the center, help them prepare enrollment forms and assist if necessary in making arrangements for each child to receive a medical checkup. Additionally, Miss Baldwin and her assistant perform liaison between the C.L.C. staff and parents, answering questions and resolving conflicts.

Failure to fill the center to capacity is causing the C&P Company to incur some loss. However, Miss Baldwin said no one expected the center to break even the first few months of operation. Nor does she think that its cost effectiveness can be measured solely in that manner. Instead, success must be based upon the "savings the company realizes from lower female turnover, absenteeism and tardiness, and savings in training expenses and recruitment," says Miss Baldwin.

As yet, no one knows why more mothers have not taken advantage of the center. Miss Baldwin speculates location may be one reason. Although situated on a main thoroughfare, many mothers would be required to make two to three bus changes to get to the center, she says. Another reason may be the irregular hours of telephone operators. Miss Baldwin thinks many operators prefer night hours because their husbands object to their leaving their children with others during the daytime.

Curiously enough, says Miss Baldwin, more service representatives than operators—the basis of the C&P survey—have enrolled children. Miss Baldwin does not know why. She has concluded, however, that mothers who have enrolled their children in the center are mainly motivated by a desire to increase their children's educational opportunities.

An indication of that desire is the high rate of parental attendance at evening sessions the C.L.C. staff conducts almost monthly. At the meetings, the center's staff briefs parents about changes and future plans for the program, answers questions and keeps parents abreast of new toys, books and other equipment their children might discuss or enjoy at home.

Several possible ways of increasing center enrollment have been discussed at C&P, according to Miss Baldwin. Busing of children was considered but rejected because of additional expense to both company and parents. Still under consideration is the possibility of entering into a cooperative agreement to share the center's facilities with other companies and institutions. Miss Baldwin said that other utilities, hospitals, department stores, a local newspaper and several businesses have expressed an interest in such an arrangement. The sharing of facilities also might be considered should C&P decide to provide another center in downtown Washington.

None of these decisions will be made until after the cost effectiveness of the center has been determined, says Miss Baldwin. "We must know if the center really does help us attract and retain employees, improve morale, reduce absenteeism and tardiness and increase productivity," she said.

The Bell System's second community-based center—the joint venture between Ohio Bell and Western Electric in Columbus, Ohio—opened its doors in August 1970. Don Honicky, Ohio Bell information manager, says the company and W.E. established the center at urging of AT&T. Parent company officials wanted another community-based center they could compare with the foster day care program Illinois Bell had launched in April.

As with the C&P center, operation of the Columbus center has been contracted. The contractor is the Early Learning Division of the Singer Company, the manufacturer of sewing machines.

Singer is branching out into education and child care, and wanted the experience of operating an industrial child care center, Honicky says. Ohio Bell chose Singer because of its considerable experience in operating day nurseries and designing curricula. Battelle Memorial Institute in Columbus, a scientific research organization noted for its educational studies, is assisting in evaluation and as consultant on the experimental center.

Singer has staffed the Columbus center with its own people. The center is situated in a renovated marine sales store in the far east section of Columbus. The site was chosen as a mid-point between Ohio Bell's downtown offices and WE's manufacturing plant.

As in Washington, parents are charged $15 per week, and the company absorbs an equal amount. The center is open from 6 a.m. to 6 p.m. five days a week. Also like the C&P effort, the Columbus facility is not filled to capacity. Built to accommodate 50 children, it has 29 enrollees.

Honicky said parents who earlier signified an interest in enrolling their children in the center have cited a variety of reasons for not doing so. Some told Honicky they had to make other arrangements before the center was opened. Others complained about the long drive to the center. And some also had fears about the safety of the neighborhood, said Honicky. But Honicky is more concerned at why other parents have not utilized the center.

Again as in Washington, the center's educational curriculum appears to be its greatest asset. Mary Lou Ringle, associate editor of Ohio Bell's magazine, *Perspective*, found that most parents enrolled their children in the center to broaden their educational experience.

Virginia Diggs, an information operator in the East Numbers Service in Columbus, said she is impressed with the way her 3-year-old daughter, Candace, has learned since she has been at the center. "She's really interested in things connected with science now," she said. "She says things like, 'When the clouds open up, it rains,' and she never said anything like that before. She is kind of stubborn until she gets to know other children, but she seems to have fit in well."

Another parent, Vikki Durisko, a commercial instructor, transferred her daughter to the center from a nursery school, because a friend touted the center's learning format. Mrs. Durisko told Miss Ringle that she thinks her daughter has become more articulate and has grasped concepts about space and distance since enrolling.

Anita Branche, a Western Electric bench hand, indicated changes in her child: "I'm pleased with the program, because my daughter is an only child, and now she is being exposed to other children. She had been staying with her grandmother while I was working and had no children to play with. I feel Shelley's vocabulary is improving already, and she is learning to share."

Bell Laboratories has engaged the Educational Testing Service of Princeton, N.J., to learn whether children enrolled at the Columbus and possibly the Washington, D.C., center have advanced educationally. Honicky calls this study of child care a fine example of "truly pure research. We went into this thing without any preconceived notions," he says.

Ohio Bell's evaluation of the center will end September 1. Honicky said Singer must be told no later than November 1 whether or not the center will be continued.

As yet, the company has not reached a decision.

"We have learned a lot about setting up the type of center we have," says Honicky, "but that does not mean that it's the type of center we would set up again or wind up with eventually."

Illinois Bell took its first step toward child care in 1969, when it established a child care task force and hired the Bank Street College of Education in New York, known for its expertise in early child development, to advise the group on alternative child care arrangements.

The college recommended three possible courses of action: cooperate with existing child care services seeking to expand; establish a fully operational model center staffed with people qualified to train employees for other centers, or work to expand child care in private homes by cooperating with institutions capable of training child care mothers.

The company chose the last course on several grounds.

First, it wanted to provide child care service at the lowest cost to its employees. Second, the facilities had to provide for children less than 2½ years of age. Third, the facilities had to be close to the employee's

home or office. Fourth, Illinois Bell did not want to enter into the child care business and commit itself to the permanent administration, legal liabilities or substantial expenses it foresaw in providing the service. And fifth, the company wanted to guarantee a high level of child care with built-in quality checks and monitoring procedures.

Ultimately, Illinois Bell hopes that it can induce other firms and companies to enter into the foster child care field as a means of helping eliminate the blight of Chicago's inner city by allowing more mothers to work.

Before it could put its foster day care plan into operation, Illinois Bell decided it would have to hire an outside institution to help train its permanent day care staff, arrange continuing professional counseling and conduct learning seminars for day care mothers. The Erickson Institute for Early Education, the graduate school for preprimary teachers at Loyola University in Chicago, was contracted to provide these services. The institute was asked to train the company's staff of four management people, as well as provide initial and follow-up training for the foster parents. Each foster mother attends a three-day seminar designed to teach her how to make home day care an educational experience for the child instead of just a baby-sitting operation. A side benefit is that the day care mother becomes better able to care for her own children while earning income at home.

Bob Raveret, Community Relations Supervisor in charge of the Illinois Bell Telephone program, says the training aspect of the program was the most vital.

"The type of training provided contributes importantly toward elevating the project to a genuine day care program as opposed to a skeletal baby-sitting referral service," Raveret says.

Company officials gave the go-ahead to begin the foster day care program in April, 1970. Internal information programs—newspapers, newsletters, brochures and flyers—advertised the new service.

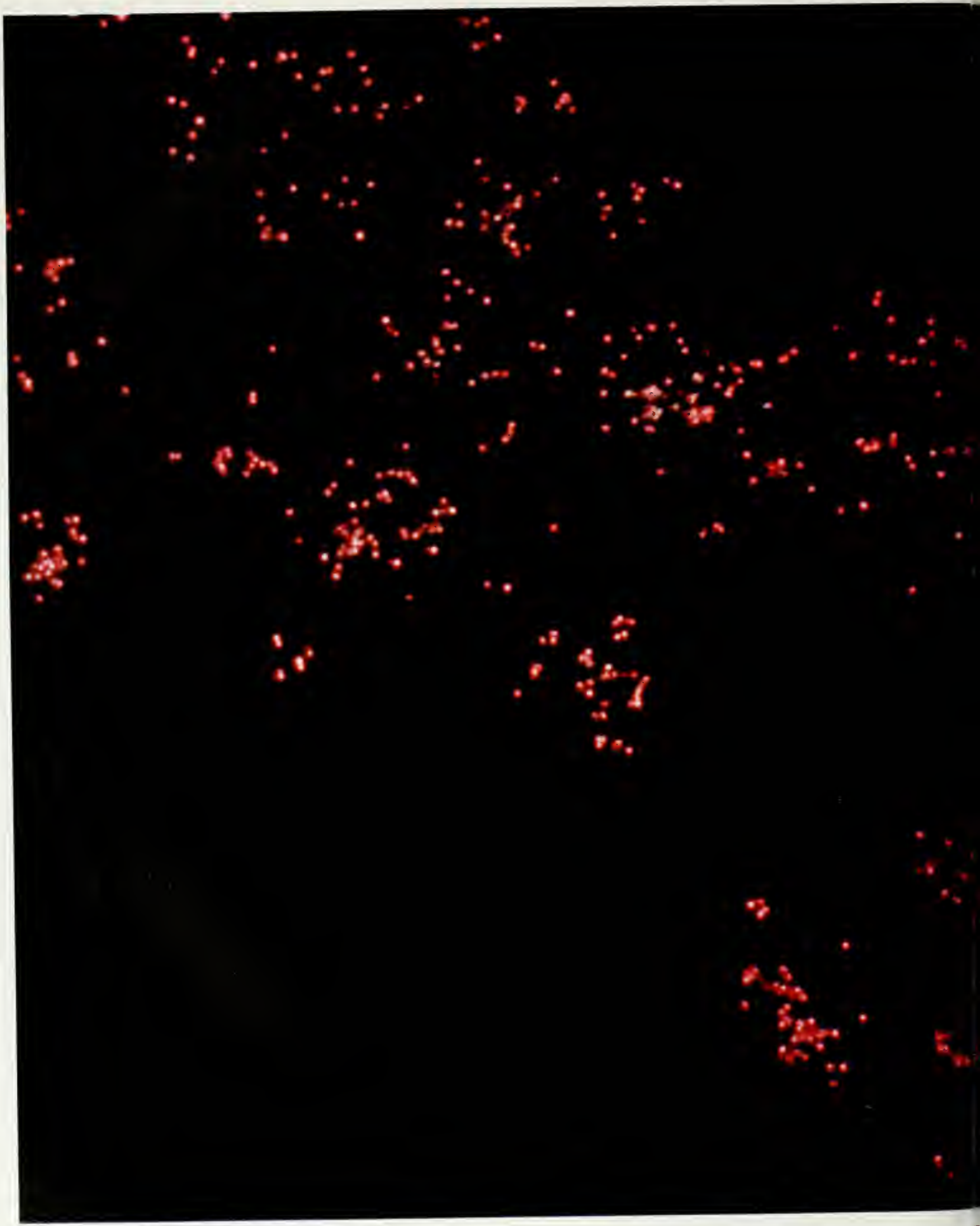
After 18 months of operation, 409 employees have requested assistance. After a request is received, the company's day care staff canvasses the employee's neighborhood through mailers, asking if mothers would like to become foster day care parents. By October 1, the Illinois Bell day care staff had asked the state to license 359 homes and had turned over the names of another 1,073 prospective foster mothers.

One problem bothering company officials, however, is their inability to fully utilize the 359 homes. Raveret thinks that failure to meet the expectations of foster mothers may cause some to lose interest in the program. Hopefully, a company drive to interest other companies in taking advantage of the home will resolve the problem. Meanwhile, Illinois Bell still has the problem of recruiting even more foster mothers in areas other than the ones where they already have been located.

Illinois Bell believes its foster care program is long past the trial stage and has proven its worth to the company in terms of financial savings, improved morale, better community relations, a greater ability to tap the female labor market and better service to customers. Raveret says: "It is hard to arrive at a reliable cost analysis of the program in terms of reduced turnover and training, because it is impossible to say whether or not a given employee would have left the company if Illinois Bell's Day Care staff had not helped solve her child care problems. However, the company is aware that some employees had already quit or were working their last week when the company found arrangements for them."

After comparing the cost of operating the day care home with the cost of training new employees, Illinois Bell concluded that if the program has prevented even half of the 359 employees assisted from leaving, it is more than paying for itself.

Ultimately, AT&T must decide whether it favors community-based centers or foster homes, a combination of the two, an entirely different approach or none at all. Meanwhile, the experiment is under way, the determining data are coming in, and enthusiasm and expectations are high. After a year of trial, day care in the Bell System has both problems and great promise.



OPTICAL FIBERS

CABLE FOR THE LASER

Light, as seen here transmitted through tiny fibers of glass, may one day carry Bell System voice and data communications. Such glass fiber paths might be used on routes ranging from a few hundred feet to thousands of miles. These *glass-coated* glass fibers are only a few thousandths of an inch in diameter, yet they offer the potential advantage of vastly higher capacity than conventional cables.

Ancient glassblowers may have been the first to notice the ability of glass to conduct light along a straight or curved path. This principle, known as multiple internal reflection, was demonstrated in 1870 by the British physicist John Tyndall, who made light take a curved path by use of a stream of water.

Early in the 20th century, scientists considered the possibility of conducting light by means of fibers of optical materials, such as uncoated and plastic-coated glass and quartz. Laser light losses, through absorption by the fiber itself and through light escaping through the surfaces of the fiber, were found to be in the order of 1,000 decibels per mile. This figure would be totally unacceptable for communications purposes.

The high reflective efficiency of glass-coated glass fibers—employing a coating glass of a lower refractive index than the glass of the core—resulted from work by B. I. Hirschowitz and others, reported in 1958, and work by N. S. Kapany, reported in 1959. Glass fibers of this type, with the lowest light losses to date—15 to 30 decibels per mile—have been reported by Corning Glass Works. Fibers with liquid cores, of similar light loss, have come out of research at Bell Labs.

With the development of laser technology, the optical fiber and the laser beam seem to be a compatible combination for further research.

Optical fiber systems may prove feasible for important interoffice trunking in dense metropolitan areas where duct space is congested and expensive. Also, the fibers may prove to be potentially cheaper per mile than copper.

Optical fibers could carry a single voice channel or a highly multiplexed channel, depending upon the accompanying equipment in use. This could help solve one of the major problems facing the business in the nation's largest cities—unforecasted growth. But substantial problems remain, such as devising methods of splicing the fibers in the field.

Nonetheless, a system for the future appears to be on the horizon.

(Part 2 of a two-part report)

With the Bell System's investment in training running into the millions of dollars annually, a new educational system must be developed, assuring training quality and efficiency.

The Better to Serve

by Dr. Harry A. Shoemaker

The scope and cost of training in the Bell System were clearly brought out in the last issue of this magazine. From the huge direct cost involved, it is evident that the stakes in quality and efficiency of training are enormous. Since the goal of training is improvement of people, the primary stakes lie in the quality and completeness of training.

There is no better way to illustrate the stakes in efficiency than to show the monetary savings possible through shortening of training time. Because trainees' salaries make up the majority of training costs—about two-thirds—even small reductions in training time can result in large savings. Obviously, even larger savings can result if it is found that a training course or a large part of it is unnecessary.

A case in point is the fundamentals training given to newly hired Long Lines craftsmen. The course was reduced from 10 to 2 weeks by eliminating superfluous content, using more efficient instructional techniques and refining the course during development. Because more than 2,000 craftsmen receive this training each year, the savings that result are impressive: $6 million in 1968 and $4 million in 1969 and again in 1970. A follow-up study showed that the job performance of craftsmen trained with the new course had improved. The magnitude of savings in this instance may be exceptional, but it is not difficult to find other recent cases resulting in large dollar savings.

The stakes in the efficiency of training have been magnified in recent years by rapidly increasing labor costs, increased turnover, more rapid technological change, increased complexity of equipment and changing trainee groups. The potential savings attainable through increased efficiency in training courses affected by these factors can be impressive. If the training for operators were to be shortened by one day, for instance, the System would save $1.4 million per year. Also, the savings would make operators available for an additional productive day on the job, which, in view of the System's high turnover, represents a substantial increase in productivity.

The savings possible through elimination of an unnecessary training course can be equally impressive. For example, the Bell System has many courses of one week's length, taken by thousands of employees each year. Elimination of a single, unnecessary one-week training course taken by 5,000 plant craftsmen a year would result in annual savings of about $2.6 million in direct costs.

The other side of the coin is the cost of *not* providing needed training. If formal training is not available when and where it is needed, the vacuum must be filled by job experience and informal training provided by the supervisor and fellow workers to develop the needed skills. This frequently is a haphazard process at best.

This is not to minimize the supervisor's role in training or the value of job experience in sharpening and broadening skills. But it is often difficult to establish favorable conditions on the job for efficient learning of basic skills. It can be a great deal more costly to achieve the same level of proficiency on the job than would be possible with a high-quality formal training program. The penalties for not providing formal training go beyond loss of efficiency. Before the employee's skills develop adequately, customer service can suffer. The productivity of fellow workers who are coaching the novice can suffer, creating poor morale. Certainly poor customer service and reduced morale, though hard to price in dollars, can be costly to the Bell System.

The penalties of low quality are much the same as the penalties of not providing training when it is needed, and they are measured in the same terms. In addition, to the extent that the training is of poor quality, the money that is spent on that training is wasted.

Improvements in quality could produce the most visible payoff where employees require more time after training to reach their maximum productivity and self-sufficiency on the job. For most jobs, a period of several months is required. No doubt, some period for improvement on the job is unavoidable. However, in high-volume jobs such as those of toll operators, directory assistance operators or installers, the reduced productivity during the period of improvement is extensive and is potentially reducible through improved quality of training.

In a study conducted in one district, it was found that about four months on the job was required before the normal productivity of directory assistance operators had developed. The costs of the low productivity during this period has been estimated to be more than $600 per operator in direct labor costs. If the proficiency of the operator were to improve 15 per cent by better quality training, and assuming that the rate of growth of proficiency remains the same as before, this would shorten by about a month the time required for operators to reach maximum productivity. Dollar savings would amount to about $100 per operator. Such a saving Systemwide would be enormous.

A tantalizing hint of what may be in store for the Bell System through improvements in training quality comes from a study conducted at Bell of Pennsylvania. This study compared new and old training courses for basic telephone installers. The new course had been developed, using modern training techniques. Results showed that productivity of graduates of the new training course was, on the average, 20 per cent higher than that of the graduates of the old course in the week after training. The numbers of craftsmen involved were small, and the findings can not be generalized across the System with confidence, because the comparison courses would differ by location. Nevertheless, there are good reasons for believing that the same benefits might be expected. The training course is highly performance-oriented; most of the course is in self-contained form, which provides a high degree of quality control. Each trainee must demonstrate his mastery of each task to the instructor before he moves to the next task.

Finally, the course was tried out and revised extensively until it was demonstrated to meet the objectives as measured by an end-of-course performance test, which consisted of performing actual installations. The course features add much credibility to the findings of improved quality over the existing course, as well as taking one-third less time, and justify confidence that the course will produce comparable improvements in performance in other locations.

It is difficult, technically, to establish norms for training quality in terms of job performance following training. And this has had an undesirable consequence—an undue emphasis on the *direct* costs of training. If one doesn't know how effective his training is, there is a strong temptation to cut training time indiscriminately because the penalties are not visible, particularly in times of tight budgets.

It could well be that the ultimate gains of assuring quality are far greater than those resulting from gains in training efficiency as measured by direct costs. Happily, there has been significant progress in this direction, but there is still much room for improvement.

Just how effective is the Bell System's training now? With some exceptions, there is no precise information. Certainly the excellent record of service provided by the System over the years reflects favorably upon training, as well as other aspects of its management. Also, among large industries, the Bell System undeniably has been a frontrunner in setting up formal training programs for both management and nonmanagement employees. But its successes in improving training in the past few years have proved there is still considerable room for improvement.

Our views of the quality of Bell System training have been strongly influenced by the emergence of new training techniques, the use of which, in addition to improving training quality, has caused us to raise standards of training quality and to look upon existing training more critically. With improved standards, the shortcomings of existing training have become more evident. Many of these shortcomings are evident from mere inspection of training materials and include such factors as: loose instructor outlines, which provide wide latitude in content and teaching effectiveness and allow for intrusion of irrelevant and erroneous information, too heavy dependence upon "telling" as a training method with little or no assured learner involvement, a lack of clear-cut performance goals and ways of measuring whether the trainees have achieved these goals and an obvious lack of job relevance.

Not all deficiencies in existing training can be revealed through mere inspection. Efficiency and effectiveness are qualities that often can not be directly observed, as many training developers have learned to their sorrow. A training course can look good but be ineffectual in changing the behavior of trainees. Again, better means are needed for measuring the quality and efficiency of training.

To summarize the areas in which there is need for improvement:

The Bell System should employ better methods for determining *when* new training should be developed, methods that contain safeguards against developing unnecessary training. These methods also must provide for training to be viewed in its proper relationship to other factors that affect job performance, such as supervision, job performance aids, methods and organization. Not only should all these factors be considered in the development of training; in many cases they must be developed together.

AT&T has recently made the decision to use a new type of Bell System Practice for plant maintenance, known as Task Oriented Plant Practices (TOPP). These new practices will provide much better guidance to craftsmen in the performance of such job tasks as routine maintenance and troubleshooting.

The use of TOPP will greatly influence the amount and kind of training a craftsman needs. But it is also true that TOPP materials must take into account the skills of the craftsman who will use them. There are trade-offs between training and TOPP. Training and TOPP developers must work closely together as a team to determine to what extent performance can be guided and to what extent skills must be learned through training.

A *systems engineering approach* must be taken in development of training in relation to other factors, as they all work together to determine job performance. This need is met through use of the *Personnel Subsystems Development Approach*, described in the last article.

Here we would re-emphasize the importance of having *objective* measures of trainee learning and ability to perform on the job. These are required not only to evaluate the accomplishments of individual trainees as they go through a program, but to measure the effectiveness of the program during its development and provide the basis for shaping up its quality.

In the past, heavy use was made of *group-oriented* teaching methods such as lectures and group audiovisual presentations such as films. These often did not allow the learner to practice what he needed to learn. The usual result was uneven learning within the group, depending upon brightness, attentiveness and degree of interest. This has been allowed to persist in much training, probably because there were no good measures of learning in the course to give the instructor feedback. The instructor might protest, and justifiably so, that he has neither the resources nor the time to give slow learners extra instruction. Then, too, there is the unfortunate attitude on the part of some instructors that if the trainee hasn't learned, it is the trainee's fault, and *he* must accept the consequences. Apparently, in such cases, the instructor hasn't realized that it is the company that pays the penalties.

Part of the answer lies in more use of individualized approaches to learning. The instructor should be held accountable for the learning for every trainee entering the course. But for this system to work, there must be a confidence that the employee is trainable and that the instructor has the resources and the flexibility to use those resources to meet individual needs. What are these resources? The critical elements are: *standards* the instructor can use against which trainee performance can be measured not only at the end of the course but throughout; *accountability* on the part of the instructor in getting trainees to meet these standards, and *assured quality teaching materials*, preferably individualized, which have been proved effective with the kinds of trainees being taught.

The materials should be sufficiently complete so that they do not leave much room for undesirable variation, thus jeopardizing quality. The role of the instructor in using these materials must be planned with the same care that is taken in their development. If the materials are complete, the role of the instructor is carefully planned and he is proprely trained and guided. This technique can go a long way toward assuring quality when the course is given by different instructors in different locations.

Minimum time should elapse between assignment of employees to new tasks and receipt of training to perform the tasks. Training has often been delayed by lack of training center capacity or periods of waiting to form a class of a given size where the volume of training is low. Trainees have sometimes been sent to courses they don't need, simply to fill a class or because the supervisor had inadequate information about how well a given course would meet trainee needs.

To the extent the training can be individualized, many scheduling problems that prevent timely training can be solved. Improved training records and course catalogues can help to prevent trainees from being sent to the wrong courses.

Even under ideal conditions, the

training environment is only an approximation of the job environment, so steps must be taken to help assure that the trainee will be able to transfer the skills he learned in training to those he will perform on the job. If the trainee is not given the opportunity soon after training to practice *on the job* the skills he has learned, forgetting will take place, and he will be doubly handicapped when he is called upon to perform these skills. Job performance in the real world presents challenges not present in training, such as negotiating with customers. The employee is best able to meet such challenges when he is confident that his skills are equal to the job.

Evidence indicates that this transition from training to the job can best be handled through use of a planned sequence of job assignments administered by the supervisor *immediately* after the employee returns to the job.

A program with these features has been used with success in the basic installation course prepared by Bell of Pennsylvania. The last lesson of the course is a planned program of job assignments to be performed by the trainee on the job under the supervisor's direction. The supervisor gives the trainee any remedial instruction he needs, then returns a checklist to the training center indicating if the trainee has successfully completed the training requirements. Another example is training for service representatives in which experience on the job is intermingled with planned instruction.

The need for updating and maintaining courses has increased sharply because of more rapid changes in equipment technology, operating practices and employee characteristics. And the amounts of resources required for updating and maintenance of materials also has increased as a result of greater use of self-contained, quality-assured training materials. The more complete the training materials and the greater the need for assurance of quality, the more difficult they become to change.

The department with the most experience in trying to deal with this problem is Traffic. Rates revisions and other changes have required costly retraining and self-instructional training programs for operators. Traffic training people at AT&T are working hard to find new ways to revise materials inexpensively without sacrificing quality.

In group-paced, instructor-led training courses, it is obvious that training quality depends critically on the instructor's performance—so critically that it hardly makes any sense to talk about high-quality training *packages* unless the concept includes a qualified instructor and adequate provision for controlling his performance. Too often, companies have failed to obtain the benefits of high-quality training packages because of lack of qualified instructors or administrators.

When Programmed Self Instruction appeared on the scene, many trainers saw it as the solution to this problem, because they thought it would eliminate need for an instructor or administrator. It was learned quickly that programmed instruction, while it can reduce variation in quality of instruction, can fail if it is not properly administered. *Self-instruction is not self-administration.*

The role of the administrator has increased in importance. It goes beyond the mundane tasks of handing out materials to students, keeping track of student progress, maintaining order and discipline, answering occasional questions and gauging his readiness to move on. In the more modern programs involving individualized materials, the administrator plays a crucial role in evaluating trainee performance and providing remedial instruction. This is true throughout the course. For example, in a sales course, the administrator may be called upon to conduct role-playing exercises and tests at the ends of lessons and to decide when trainees are ready to move ahead to more advanced lessons. Other recently developed courses involve a mixture of individualized instruction and group instruction. Here the role of the administrator in managing the instructional process is extended even further. Such courses present a great challenge to assure control over quality.

Now we will turn to the question of what steps can be taken to bring about needed improvements. Defining the problem is half the battle. But one truth should be apparent: there is no single solution. In fact, the greatest problem is believing that there is a grand solution.

The manager looking to improve training well might ask *where* to find the means. The answer lies much in taking a more problem-oriented rather than a solution-oriented approach. Adopting the former can represent major progress, but it is only a first step in the quest for improved training. The manager needs to know *how* to identify a need for training, to study and document job requirements, to derive skills and knowledge requirements and formulate training objectives, to design instruction and conduct evaluation and revision.

The need for a *system* should be evident. A system must assure that training problems will be detected accurately, include all techniques and tools for solving these problems and assure that the appropriate technique will be selected for each problem. What is needed is a complete technology of instruction or training.

Instructional technology embraces all useful techniques—old and new. However, the heart of instructional technology is a systematic approach to development and implementation of training. With some variations all AT&T operating departments have adopted it.

First, a limited pre-project study is conducted to determine whether there is need for training, the nature and extent of the need and how it should be met. The numbers and types of people to be trained and the duties and tasks they must perform are determined. The payoffs of performing a pre-project study have been demonstrated in the Plant Fair Share program. In several cases, such studies have prevented development of costly, unnecessary training. The pre-project study may also indicate needs for other actions such as improvement of job performance aids, job design, supervision or feedback to employees about the adequacy of their performance.

If need for training development is found, a project plan and a job study plan are prepared. The project plan shows a schedule of phases with completion dates, and the job study plan describes the kinds of information required and how it will be gathered in order to determine what the graduated trainee must be able to do.

In the second phase, detailed job task data are gathered through observations, interviews and questionnaires sent to employees and supervisors. If the job is new, task procedures may have to be designed, based on available documentation and analogy with existing jobs. Next, general training objectives are prepared, describing how the trainee is to demonstrate that he has learned the skills and knowledge to do the job.

In the third phase, specific training objectives are prepared, further detailing what the trainee is to be able to do at the end of training. A criterion test is designed for use at the end of training to provide a measure of whether trainees have met the objectives. It evaluates the course as it is being developed. The training design prescribes the strategies, media and testing to be used throughout the course to determine whether trainees are learning adequately. The design also prescribes the roles of the administrator or instructor and line supervisors.

In the fourth phase, course materials are developed within the chosen training design. They are tried out on learners who are representatives of persons who will take the course and are edited and revised until test results show they really work. Guides for administrators and supervisors are prepared, as are plans for testing the materials under realistic field conditions, using typical trainees, instructors or administrators and actual training facilities.

A field test is then conducted during the fifth phase, and data are gathered to determine trainee learning and acceptance of the course, administrator performance and adequacy of facilities. Once necessary revisions are made, plans are completed for introduction of the course. This includes training and assignment of administrators and instructors, construction or purchase of equipment and facilities and orientation of supervisors so that they will know how and when to assign trainees to the course and what to do to smooth the transition between training and job performance.

During the sixth phase, the training is introduced in the field, and plans are made for on-the-job follow-up of trainees to find out how well they're able to use their new skills and to seek any omissions in training. Techniques are similar to those used in the original job study. Plans include checks to determine whether the training is being administered correctly.

In the seventh phase, a follow-up job study is performed, and plans are made to revise the training and administrative materials, facilities or any other necessary changes.

In the eighth and final phase, remedial action is taken. If revision has been extensive, retesting of materials is necessary. Otherwise, the course is considered complete. Under some circumstances, it is desirable to conduct a study to assess the course's worth, either in relation to its original need, or in comparison with existing alternative courses. This, however, is usually not necessary unless there is reason to believe the training is not worth its cost or is not superior to the course it may be replacing.

This is the barest outline of the systematic approach to training and implementation. Each phase requires many decisions. Obviously, the approach is not a technique but a discipline.

In addition to the means for assuring quality and efficiency mentioned earlier, gains in efficiency can be realized through use of individualized, self-paced training as contrasted with group-paced training. The main reason for this is that group-paced instruction must be paced to the slower learner. When learners are allowed to proceed at their own pace, the average learning time is bound to be less, assuming constant quality and content.

In addition to features that help to assure general training quality and efficiency, the systematic approach and other aspects of instructional technology have other benefits. The trainer is free to use any of the wide range of training techniques and tools, provided they are relevant to specific needs and have a reasonable prospect for success. Many instructional decisions have to be made on the basis of less-than-perfect knowledge, either because of limitations in the state of the art or uncertainties about the learners. In the final analysis, if the employees demonstrate their ability to learn and to do the job, the techniques selected can be defended.

Another benefit: Instruction can be tailored to the needs of the learners. Steps are taken to identify the persons to be trained and to estimate their present skills and abilities relevant to the training. Developers use these estimates in designing materials.

Later in the development phase, materials are tried out on trainees and are revised until they are proved to match the learners' needs.

The problem of stability of quality is approached in two ways. The first is to try to make instructional materials so complete, so self-contained, that they allow no room for variation, e.g., self-instructional materials. The other approach lies in the *management* of training. If an instructor is provided with a clear-cut standard of performance to be met by training, and if he or she is held accountable for getting trainees to meet these standards and is given the necessary resources, stability can be assured. The answer lies in putting these two approaches together. The payoffs in the future use of instructional technology can be great, and active steps must be taken to gear the Bell System to get the most out of it.

Here are some of the directions in which the System must move to make more extensive use of instructional technology. Each step should take into account the kinds and amounts of resources needed to assure quality training:

The applications of instructional technology require substantially greater skills than those used to develop training in a conventional fashion. This has far-reaching implications for selection, training and organization of those who are to develop training. Experience indicates that development of skills necessary to develop high-quality training requires at least a basic workshop in instructional technology of two weeks or so, plus several months of on-the-job coaching by a competent project manager. A project manager should not be assigned until he has had basic training and experience in the successful completion of a project. Administrators and higher-level training managers should at least receive a basic orientation course in instructional technology. In the Fair Share program, in addition to other training, district level administrators and project managers attend a one-week workshop on the use of an administrative plan for development and standards for evaluating the products of training development.

These skill development requirements must be taken into account in determining how to staff a training development organization. Job assignments must be of a length that permit development of skills and allow the organization to realize their benefits. A good case can be made for including some permanent cadre of professional instructional technologists in a training development organization and establishing career paths for training developers to fulfill the need for qualified people to fill advanced positions. A complementary approach is the creation of a separate professional resources unit such as the training research group at AT&T.

Both AT&T and the associated companies rely primarily on rotational assignments to fill training positions, though in a few cases positions have been created for specialists in instructional technology, for example, the AT&T Training Research Group, Traffic and Engineering at AT&T, Bell Laboratories, BISP, Illinois Bell and New England Tel. The policy of rotational assignments can be expected to continue, though managers are awakening to the need for professional skills.

To obtain the benefits of instructional technology more manpower and time is required for training development. Based upon considerable experience, a conservative estimate is that 100 hours of development time is required for each hour of quality training. Thus, two man-years are required to develop one week of quality training.

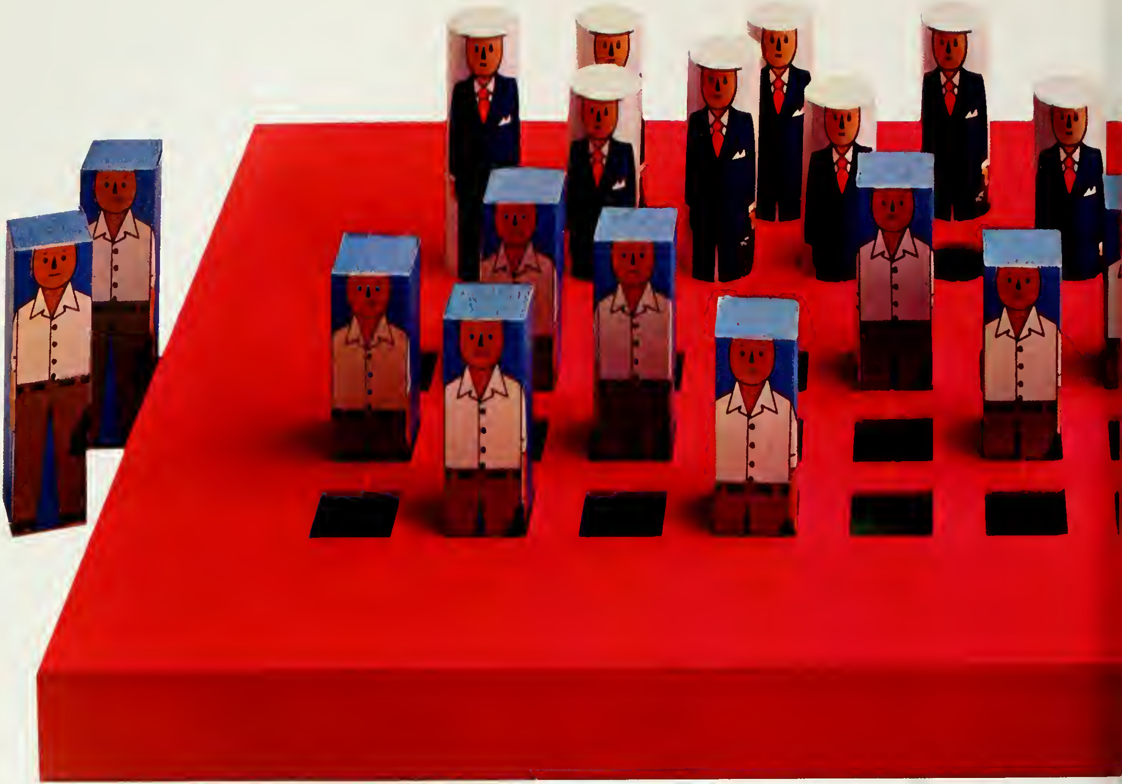
To advance the state of the art of instructional technology will require that the Bell System commit more resources to research and development. What isn't known far outweighs what is known about instructional technology. There is need to learn more about nearly all aspects: analyzing job requirements; setting performance standards; analyzing learners' needs and tailoring materials to their needs; selecting the best instructional strategies and media; producing instructional materials; setting standards for training development; designing training facilities, and selecting and training course developers and administrators. Some work is already under way in these areas. The course maintenance system, being developed by Bell Labs for the Bell System Center for Technical Education at Lisle, was described in the first article. It is a good example. But a more extensive program is required, taking as its point of departure the systematic approach to training development and implementation.

Many will be discouraged by the cost in time and dollars of developing quality training, and some will argue that the approach, thereby, isn't feasible. They will point out correctly that lead time often is limited and will not allow time to develop quality training. However, long-range development efforts have demonstrated payoffs. The Long Lines fundamentals course cost $400,000 and required three years to produce. Its estimated life expectancy is at least five years. It is expected to save about $20 million compared with the previous training, which is more than 50 times the cost of development.

As large as development costs might be, they comprise a small portion of total training costs. In 1971, the total costs for plant training were more than $300 million. Of this, only $5 million was spent in course development, less than 2 per cent of the total. Another way to put the costs of development into perspective is to amortize them over the number of trainees who will be trained with the course and compare the development costs per trainee with other training costs. For example, in the Long Lines fundamentals course, let us assume conservatively that 10,000 trainees will take the course during its life expectancy. Development costs per trainee amount to $40. This can be compared with the cost of training per trainee, which is almost $1,000. The ratio of training costs to development costs is 25-1. This puts development costs in the proper perspective in view of the large multiplier factor in much System training. Thus we can afford a large investment in training development to protect a much larger investment in training costs and the still larger investment in labor costs on the job.

The Bell System has a large stake in improving the quality and efficiency of training. These improvements are within our reach if we gear up to take advantage of the new instructional technology now available. Our objective will be met if managers know that the benefits of using instructional technology are worth the price. We should take the steps necessary to realize further benefits and improve the state of the art.

Harry A. Shoemaker is Training Research Manager at AT&T. He received a Ph.D. in Psychology from the University of Colorado in 1953. He held teaching positions at Washington State University and the University of Oregon before joining Bell Laboratories in 1962.



MANPOWER NEEDS AND THE URBAN SCHOOLS

by G. T. Bowden

In the 1970's urban schools will continue to be a major source of employees for telephone jobs. Because a growing number of high school graduates are going to college, and because urban schools are having difficulty providing basic education to others who become available for telephone jobs, it is in the Bell System's best interest to help the schools cope with growing educational problems.

Although reduced economic activity in 1971 increased the availability of qualified applicants for telephone jobs in many cities of the Bell System, recruiting and retention problems continued and are still with us. In 1971 the annual loss

rates for the first half of the year, for example, were 25 per cent for women and 10 per cent for men. An upturn in business activity will tighten the labor market and present the Bell System with manpower problems similar to or more serious than those the System had in the years 1966-70. The educational preparation of available manpower has been and will continue to be inadequate as more and more high school students go on to college and the remainder available to business consist more and more of dropouts and others "turned off" by their school experiences.

A business like ours can help the urban schools in several ways to improve the quality of education. We should increase the efforts we have already begun, as well as seek new and better ways of providing aid. Although we do not have control over urban conditions or the urban schools in particular, we are a large employer with extensive management experience—which can be useful in various ways in most of the major cities of America.

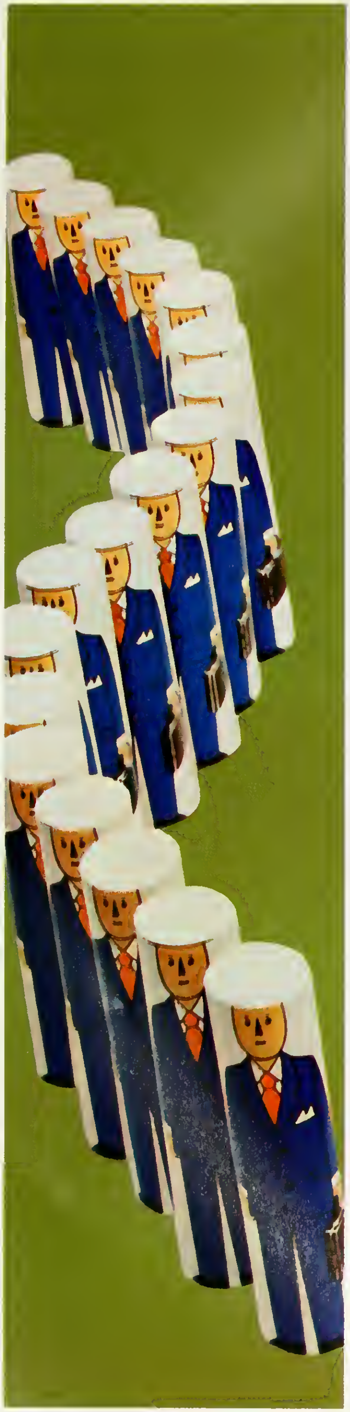
According to the best estimates we have of population growth and growth in the economy in the next decade, the Bell System will need to increase its employee body by about 30,000 people per year. We will not only have to hire people to replace those who leave the busi-

Recruiting and retention problems continued and are still with us.

An upturn in business activity will tighten the labor market.

In the next decade the Bell System will have to increase its employee body by an estimated 300,000 people.

Child care legislation will certainly influence the number of women available for work.



ness for other work, those who retire and those who leave for other reasons, we will also have to hire people to meet the demands of growth. If the preparation of those available to us does not substantially improve, the number that will have to be interviewed and put on the payroll to achieve this net increase will be many times 30,000.

There are several factors that could reduce or enlarge this ratio and the scale of the problem.

First, if child care legislation now under study by Congress should become law, the number of women available for work (those with preschool children) might increase, and the Bell System could expect to attract a certain number of these women. But there are several questions regarding child care. Are working mothers more reliable and productive employees than the women without these responsibilities? If they are, their availability could reduce our hiring problem. But will the costs of assisting with child care be offset by savings in force loss and absenteeism? Can we assure that the child will have a beneficial educational experience?

Second, if we can transfer more of the work now in the Plant, Traffic, Commercial and Accounting departments to machine technologies, this could reduce to some extent our needs for certain job skills. But if we go by past experience, this reduction is unlikely to be large.

Third, if we can change working conditions by changing the hours of work, offering more part-time work or rearranging job tasks, our jobs might attract able people who do not now have an interest in working for us. Members of the Environmental Research and Development, Personnel and the operating departments are exploring these and other innovations in working conditions that might make telephone work attractive to people otherwise unavailable.

Fourth, if economic conditions should develop to make telephone jobs more attractive than they now are in relation to opportunities in other businesses, our manpower recruiting problem would be eased. Since 1971 we have been in such a situation as a consequence of layoffs in other businesses. People who would not otherwise be in the employment market are now looking for work, and the Bell System benefits from this situation. How temporary such a situation may be is difficult to predict. But for reasons of higher wage rates or working conditions in other businesses, we should assume that when the economy revives, these persons again will be attracted by job opportunities in those businesses and will not be interested in telephone jobs.

Yet, even if all of these possibilities should materialize in our favor, it seems unlikely that they would meet our total manpower needs—we will still need to hire from the high school age group.

The business of modern telecommunications needs people with many different kinds of skills and education. These needs range from the person with a Ph.D. specializing in mathematics or solid-state physics to jobs requiring less than high school education.

Although the needed variety of skills and educational preparation is extensive, the required number of *highly trained* people is relatively small. In 1970 the Bell System hired 7,633 technical and nontechnical graduates of colleges and universities, which is roughly 3 per cent of all employees hired that year for replacements and growth. Of the 1,005,000 employees in the Bell System at the end of 1970, less than 5 per cent were graduates of colleges and universities.

While these percentages will vary from year to year, the size of this need for highly trained people will probably remain about the same.

The great majority of those hired to meet the Bell System's needs are persons with high school, technical school training or less. And of this majority, more than half are products of the urban schools. Most of the 300,000 we will have to add to our work force in the next 10 years will have been educated in the nation's urban schools.

Our greatest needs now and in the next decade are for people who have the knowledge, skills and work motivations required to learn and perform the clerical and craft jobs of the Plant, Traffic, Commercial and Accounting departments—such jobs as installer, frameman, operator, service representative and service order clerk.

The educational preparation required for these jobs is essentially what we have come to expect students to learn by attending the elementary and secondary schools in our towns and cities. Historically, we have been able to assume that this school experience would provide young men and women with the skill and knowledge base for learning telephone jobs.

Ten years ago it was possible for us to find enough high school graduates who had the basic educational preparation to fill our needs. Since then the situation has deteriorated in many cities to a point where we can no longer assume so. Many are coming out with less than eighth grade reading and arithmetic ability. Has the performance of the schools in basic literacy training been declining, or has business simply been forced to hire more from the less able and less motivated student groups? Actually, both conditions have occurred.

In 1971 we still found in some of our cities that many high school graduates could not meet the basic literacy requirements we consider essential for learning and doing our entry level jobs. As a result, it has become necessary to give more and more remedial training.

How much remediation is being given is difficult to estimate because some of it is added to initial training courses. However, surveys of remedial education in the System in 1970 indicated that most of our companies were doing some remedial education to supplement initial training. This training ranged from a half day to many weeks, depending on individual needs, and added some $15 million to training costs.

As for the quality of school performance, hard facts also are difficult to obtain. However, there are enough published statistics available to indicate that in a number of cities the achievement levels of students have declined in recent years.

In California in 1969, the Pacific Company expected to hire 25,000 people per year in the next five years. Based on previous experience, of this number only 600 per year were expected to have college degrees; *the rest would be high school age students, dropouts or graduates*. To get 25,000 people per year (this is not a net figure) the company was interviewing 250,000. Although some of these were turned down or accepted jobs in other businesses, of the remainder, 50,000 failed to meet the lowest requirements in literacy skills. Perhaps 5,000 of these were accepted for employment on the assumption that they wanted to learn and could be helped to acquire basic reading and mathematics skills. The cost of remedial education was estimated at $5 million over a five-year period.

In New York City schools, the reading levels of ninth grade students declined over a three-year period in relation to the national average. In Chicago schools, tests of student abilities in reading and arithmetic showed deterioration from 1966 through 1970.

Although the quality of employee applicant preparation improved in 1971, this has not generally come about through any improvement in the quality of basic education provided by the schools, but largely by virtue of the fact that better qualified people have become available as a result of layoffs in other businesses. These fluctuations in employment conditions can not only influence the quality of applicant preparation by making better-prepared people available to us, but they can also influence the work attitudes of those already on the job. The prospects of unemployment and layoffs cause some employees to be more concerned about doing a good job and staying with it.

Despite the effects of unemployment and business activity on the quality of manpower sources, the realities of school performance have important limiting effects, which are relatively steady. Because the top half of high school graduating classes typically go on to college, the available labor force for business tends to come largely from the bottom half of the class.

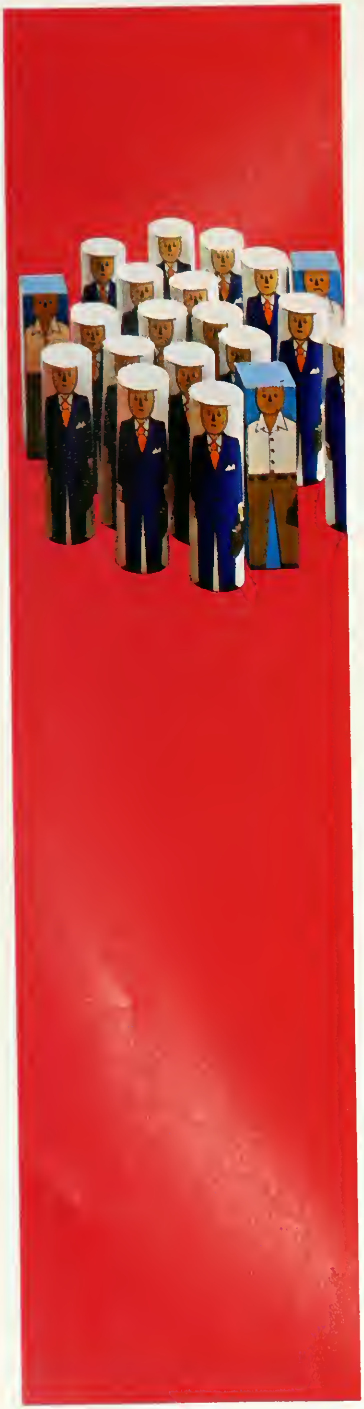
If the present trend continues toward college education for more and more high school graduates, the portion (if not the actual number) available for jobs in the world

Our business requires people with different skills and education.

Most of the employees we hire in the next decade will come from urban schools.

We could once hire high school graduates who had at least basic educational preparation.

To hire 25,000 employees annually in the next five years, Pacific Tel. will interview 250,000 per year.



of work will decrease. With this decrease in supply in relation to business needs the competition for non-college-bound students will intensify, and those available, because they will represent the less able or less motivated student, will require more remedial education.

Because of living conditions, family background and opportunity, at least 50 per cent of the urban school-age population will apparently come through the school experience, regardless of school conditions, with basic skills, knowledge and work motivations adequate not only for business but for higher education. This half of the school-age population will go on to college and so will not be available for employment until several years later. By that time their aspirations and expectations may cause them to regard the basic jobs of business as unchallenging or unsuitable.

Because of these same conditions, a certain portion of the urban school-age population (possibly 10 per cent) seem not to respond well to any known ways of teaching the basic skills, knowledge and work motivations essential to business jobs or to higher education. This portion of the school-age population is born into, and grows up in, a class culture that is "present-oriented" and largely averse to the "future-oriented" requirements of formal education.

Of the remaining 30 to 40 per cent of the school-age population, whether for personal reasons or because of school conditions, a large number acquire a less than adequate education in basic skills, knowledge and work motivations. Some of them drop out. Others stay in school but receive a diploma that represents attendance—not learning achievement.

With such realities facing us, what courses of action are open to a business like ours? If urban education is an appropriate and desirable concern for the Bell System; how can a feasible course of action be determined?

In 1969 the urban education staff of the information department consulted with leaders of urban school systems and representatives of the associated companies in the System as to the most urgent and basic problems then confronting urban education. With their views and an analysis of other pertinent material, problem areas were identified, particularly those that related to business needs and capabilities. These were: Remedial Education, Vocational Education, Administrative Skills and Practices, Preschool Preparation and Determination of Community Goals for Education.

In each of these areas, projects were formulated that could be developed and made available to urban school administrators and teachers in those cities where their results might be useful.

These projects were not designed with any expectation that they would be a complete or final solution to major problems of all urban schools, but rather that they would be a useful contribution to the solution of a recognized educational problem in particular urban cities. They were selected as model approaches to problems of local scale, which, if found useful in helping to improve in a small way the quality of urban education in one city, might be applicable to similar problems in other cities. The projects were further selected, keeping in mind our manpower needs and our capacities as business managers to produce a usable approach to educational preparation problems of concern to us and the community.

After two years, promising approaches in all of these problem areas were developed and are now in various phases of testing. In all instances Bell System management has worked closely with educators.

The remedial education needs of high school graduates and dropouts who apply for work show a need for improvement in whatever the urban schools are doing. Although many educational problems are technical and must be solved by educators, business can help solve some of the others.

One approach has been work-study programs that enlist the high school student in classroom learning and part-time work in a business job on an alternating basis. Most companies have some form of work-study arrangement, but the number of students (2,700 in 1969-70) is small. Comparative studies, however, indicate that work-study programs can have substantial positive effects on classroom learning and work performance when the program begins in the junior year, when it provides paid work on an established job and is managed by able persons in the school and the company.

Another approach to remediation, recently tested in the New York Company, is an *Instructional Management System for Remedial Reading.* It specifically addresses the motivation problem through the use of a "peer-mediated" teaching-learning process. In this process, students work alternately in pairs as teacher and student, each pair going at its own pace through a sequence of reading tasks. This approach has achieved important improvements in the time required to cover material and in motivating students to complete the course. The South Central company is now helping the Jackson, Miss., schools to apply this system to several elementary and secondary courses.

Tutor Training: Another contribution is the tutoring of students by qualified employees who want to help. This effort involved 10,000 employee volunteers in 1970 and could be expanded. One of the obstacles to expansion has been a lack of orientation and training for tutors. Experience has shown that knowledge of a subject such as reading, arithmetic or geography is not enough for effective tutoring. Rapport between the tutor and the student is essential, and the achievement of this relationship often requires a lengthy, sensitive and patient exploration of many unrelated topics that are in the mind of the student and must be discussed before tutoring can proceed.

A training course to prepare tutors has been developed and will be made available to the associated companies in the next few months.

Improvement of Vocational Education: Vocational and general education in high schools has proceeded in the last two decades with very little input from employers. Similarly, employers have taken no more than a casual interest in what the schools were producing. As businessmen have had to hire young people with less and less basic preparation, the real educational needs of business employees have required some clarification. It is simple enough to say that high school graduates should be able to read and do arithmetic, but when the applicant cannot read or calculate well enough to take basic job training courses, the business requirements and the school requirements must be re-examined.

The technical design and teaching of school courses are matters for professional educators. The relevance and adequacy of this for community needs is a concern for the community. It is the responsibility of business and other employers in a community to be as clear and precise as possible about their needs and to make these needs known to the local school people who design and teach courses.

Because a mismatch has become evident in recent years between school output and business needs, AT&T and Ohio Bell initiated a project with Battelle Memorial Institute to develop a method by which the basic skills, knowledge and work disciplines of entry-level jobs could be determined and described in educational language.

This method will be available to the companies by the end of the year. It will be useful not only to businesses in providing schools with a clear, precise description of their basic educational needs, but to training staff groups in the development of job training materials.

Vocational education has also suffered for many years from a widely accepted bias in the community and in the school system in favor of college preparation as the central focus for elementary and secondary education. As a result the courses offered in vocational education have been viewed as second-class choices.

This "college" bias is strong in the minds of many parents and teachers. Ironically, it is a disguised bias in favor of more prestigious vocational and professional training for which college education presumably prepares the student. The earning power and personal satisfactions of the lawyer, doctor, teacher, scientist are presumed to be superior to those of the craftsman, the technician, the office and factory

The projects were not designed to be a complete and final solution.

One approach to helping urban schools has been the work-study program.

In 1970 some 10,000 telephone employees across the country volunteered to tutor high school students.

In recent years a serious mismatch between school output and business needs has become apparent.

There is a great need for improvement of vocational education.

A training program on administrative practices is being prepared at AT&T.

The educational expectations of the community must be taken into account in the school system.

As a large employer in most large cities, the Bell System has a stake in the fate of urban education.

worker. The "all-chiefs-and-no-Indians" society has become an implicit dream that arises perhaps out of our belief in our ability to bring about utopian solutions to rather complex social problems.

The results of pursuing this objective are now becoming evident in a gross mismatch between student-parent aspirations and the real needs of the world of work. The needs of the world of work for college-educated persons are much smaller than our educational system has been producing. As a result, service jobs essential to an affluent, technological society go begging, and the colleges are filled with students who expect to find jobs that do not exist.

Ways must be found to correct this mismatch, measure the dimensions of the mismatch and get better knowledge of the world of work.

As a first step, businessmen and educators concerned with vocational education should explore ways and means to correct the mismatch, jointly and separately, in particular cities where results could be evaluated. Bell System companies are working with the U.S. Office of Education to hold a series of business-education conferences in selected cities as a first step in improving the local relevance and quality of vocational education.

Administrative Skills and Practices: Although J. S. Coleman, in his book *Equality of Educational Opportunity,* found that student achievement was more strongly related to student and parent attitudes toward education than to any other factors such as school facilities, per capita expenditures or teacher-student ratios, the administrative skills and practices of urban school systems have had an important influence on teacher and student morale. The short tenure of school administrators in recent years in many cities has been attributed to shortcomings of administrator training and to management practices inadequate to meet the needs of large urban school systems.

In 1968 leaders in public school education strongly urged us to make available to school administrators the best concepts and approaches to management problems that had developed from our business experience. They stated that although long-term academic training in educational administration had its merits, and while some business schools had experimented with courses for university administrators, the need for basic administrative concepts and skills was urgent among administrative people already coping with the daily problems of urban schools.

To make a start on this problem, members of the urban education staff at AT&T, in cooperation with the associated companies, initiated three urban executive seminars that brought together department heads and school administrators from 27 of the largest cities served by Bell companies. Communication with community groups was the topic explored. As a result of these seminars and related work by the urban education staff, experiments in administrative training have been started in several cities.

Our staff people are also working with professional educators to develop a full orientation and training program on administrative practices that could be utilized by superintendents of urban school systems.

Preschool Education: Better preparation for school learning has been widely cited as a major need of preschool-age children in the cities. Studies indicate that the preschool years are a critically important period for the development of learning ability. Defects in this experience become progressively harder to correct in later years.

Although this is an important factor in the improvement of urban school performance, one may well ask why the Bell System should become involved and in what way it is prepared to contribute.

Obviously, the Bell System has no expertise in preschool learning, nor should it have. But, in terms of personnel needs, the mother of preschool children is a potentially valuable employee. Thus, if we are to explore this source of employees, we must enlist the help of professionals in preschool learning.

The Bell System is now engaged in three projects to determine whether company-supported child care facilities will help to reduce the net costs of low employee productivity and employee losses. The answer to this question will depend not only on what happens to the mother who comes to work for us, but also on what happens to the child. The System must be concerned that the experience of the child is not harmful and that insofar as possible the child grows mentally and emotionally.

By assuring a better start for these children, we are increasing the probabilities that they will benefit from their school experience and come to the world of work much better prepared.

The projects concerned with these economic and educational issues are being sponsored by The Chesapeake and Potomac Telephone Company in Washington, D.C., the Ohio Bell Telephone Company and Western Electric Company in Columbus and the Illinois Bell Telephone Company in Chicago.

Determination of Community Goals: A problem underlying all others in urban education is confusion over the aims of education. It has developed from a variety of circumstances, but perhaps the main causes have been a too rapid and unrealistic rise in our educational expectations as a nation and naive beliefs as to what is educationally possible and desirable. Regardless of causes, this confusion has many facets. Probably the major confusion has arisen over educational priorities such as vocational versus college preparation, literacy skills versus emotional growth, accountability of the schools for the efficient use of resources versus more schooling under "open enrollment" standards.

It is not the responsibility of the Bell System or any other business to decide these priorities. It is, however, the right and duty of all sectors of the community to have a school system that meets the community's reasonable expectations.

It is now increasingly acknowledged by school administrators that the educational expectations of the community must somehow be taken into account. Legitimate community interests, however, must somehow be identified, reconciled and distilled into a body of expectations that school people can understand, agree on and take into account in their construction of an effective educational process. This is important also because the community must feel that their expectations have been fully heard and taken into account. A way must be found to unite school wisdom and community wisdom in this educational process. This is the only basis upon which educators can successfully combine curriculum changes, teacher training objectives, administrative improvements and other changes in ways that will have full support of the community.

No effective way has yet been found to bring this about, but a promising approach has been developed as a collaborative effort of AT&T, Ohio Bell and the Battelle Institute. This approach is now being tested in Columbus, Ohio, and will be available for other trials in other communities this year.

Regardless of the innovations that will be developed within our business to cope with our manpower needs and to reduce our manpower problems, it seems clear that the urban schools will continue to be a major source of our manpower in the seventies. It seems equally clear that, as a large employer in most of the large cities of this country, we have a substantial interest in what happens to the urban schools. We, therefore, have a stake in understanding the problems of the urban schools and in working with them in appropriate ways to improve the quality of education they are able to provide to the communities they serve.

The Bell System is an important member of these communities, not only as a receiver of benefit, but as a corporate citizen with a responsibility to do what it can to strengthen the vitality of the community. The projects briefly described here, if applied to educational problems in the cities we serve, could have an important cumulative effect of value to the Bell System as well as to the educational process in this country.

Gordon T. Bowden is director of educational relations at AT&T. He began his career with the Bell System as a personnel counselor with Western Electric in 1944 and assumed his present duties in October of last year. He holds a doctorate in sociology from Harvard University as well as an undergraduate degree from Harvard College.

Communications for a Super City

Down along the banks of Buffalo Bayou in Southeast Texas lies a city that some urban experts contend should never have happened. As far as the eye can see in every direction the land is flat. Both temperature and humidity hover in the nineties and can even hit a hundred from late spring to early fall. The shipping lanes of the Gulf of Mexico are almost 50 miles away. Sam Houston never would have believed the town named for him could grow as it has in 136 years.

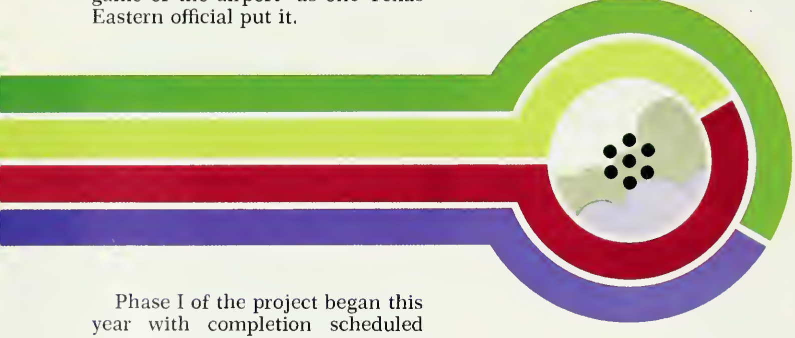
Houston's limits are nearly 40 miles apart in some areas, and the city has frozen a thousand square miles by initial annexation to prevent being boxed in by surrounding cities. Projects such as doubling of the Central Business District (C.B.D.) are relatively easy, because there are no razing problems such as those encountered in Pittsburgh, St. Louis or Boston. Land and labor are cheaper than in large cities in the Northeast and on the West Coast.

During the sixties Houston added six million square feet of office space to its C.B.D. Four months into 1970, plans were announced for considerably more. The biggest project—the 21st century super city that will be called Houston Center—covers 74 acres of land now occupied by parking lots and inexpensive storage buildings. The idea for the project started with two men,

14

George Brown and Baxter D. Goodrich, the chairman of the board and the president of Texas Eastern Transmission Corporation. Texas Eastern's main activity is piping natural gas from the East Texas fields to the East and West coasts.

Houston Center, to be totally financed by Texas Eastern, will cost an estimated $1.5 billion and ultimately will add 23 million square feet of office space to the C.B.D. This compares to nine million square feet for New York's giant World Trade Center. Its main street level will be four stories above the rest of downtown Houston. The lower levels will provide parking for up to 40,000 cars. The elevated street level will feature air-conditioned malls served by moving sidewalks and electric trains. The complex will be self-sufficient, with services planned so the resident never should have to leave his neighborhood "except to go to a ball game or the airport" as one Texas Eastern official put it.



Phase I of the project began this year with completion scheduled around 1975. The final phase hopefully will be finished by 1990. Like everything else, it all depends on the economy. If Phase I is completed as planned, it will represent about a third of the total project.

To serve Houston's city of tomorrow, Southwestern Bell is making ready to provide the ultimate in telecommunications. Electronic Switching Systems (ESS) will provide service. Custom calling, Touch-Tone® and Picturephone® services will be available for those customers who want them.

"The problem is," says commercial engineer Ed Chronister, "there is no telling now what the customers are going to want or how much they will be willing to pay for it. That ultimately will decide the trend of telephone service for Houston Center."

Neither custom calling services nor Picturephone service has been introduced in Houston. Consequently, rates are yet to be worked out, but both services eventually will be available—including intercity Picturephone service. Southwestern is to construct a three-story central office equipment building, framed for 20 floors, near the complex. Picturephone service will be provided through a nearby 17-story toll center, which is equipped with crossbar equipment required for the service and which will facilitate intercity service.

"Serving the center will involve a completely different concept of outside plant," says Ross Anderson, Southwestern's plant extension engineer. "For example," he joked, "if we were to put our equipment building inside the complex, the cable vault would probably be on a fourth floor instead of the basement, which would require a flood of epic proportions to damage it." Anderson explained that a series of *utility corridors* to carry telephone conduit and gas and electric lines will be run throughout the "street," or fourth level of Houston Center. "Our problem will be to get our plant up to the fourth level from the 60 underground cable ducts we plan to run to the complex. Obviously, it'll have to go up through building structures to enter into the utility corridors. But just *how* has not been worked out yet by their engineers and ours. We're talking."

Another problem, Chronister points out, is not to get carried away and waste time and money putting in too much plant at one time. "Nobody knows exactly how many people are going to move into the business and residential spaces or how fast. We are preparing, of course, to neither undershoot nor overshoot the service needs, but to be ready to provide what is needed as it is needed.

Representatives of the Marketing, Commercial, Plant and Traffic departments have been working with the Houston Center planners since the complex was announced. Before the project is over, it's expected that a district office will be created to serve the center.

By 1975 Southwestern Bell expects to have 10,000 main telephones installed in Houston Center. All PBX service is to be provided from central office plant, rather than customer premises equipment. Texas Eastern, its prime contractor, Brown and Root of Houston, and Southwestern Bell anticipate fewer problems than were encountered on such large projects as the World Trade Center, mainly because the 33-block area is not densely populated even though it is adjacent to the C.B.D. However, old telephone plant will have to come out to make room for new. Chronister points out that the city of Houston will not allow all plant to be installed for the entire complex at once. "Therefore, we're working on a 13-year forecast instead of a 20-year view," he says.

"It will be climate-controlled the year round, and they won't have to drive cars or trucks to get to where they are going." Because of the absence of vehicular traffic on the main level, Southwestern will concentrate on installing dedicated, or permanent, plant in the complex, to minimize the amount of equipment that installers and repairmen will have to haul around for customer change-outs or repairs after the center is completed.

The main problem that Southwestern's people see in the project is its sheer size. But for years Houston has fluctuated around the third or fourth position among the fastest growing cities in the country. They're accustomed to exploding expansion all over the city. They're confident they can provide what is needed when it is needed.

EDITORIAL

The Law of Being The Best

There is much thought, talk and activity throughout the Bell System (and in the pages of this publication) these days about increasing competition in providing telecommunications service to the public. Ever since the common carrier concept was first enunciated, this business and the independent telephone companies throughout the land have served the communications public, largely unfettered by "outside" entrepreneurs shooting for a slice of the pie. There *have* been such alternatives to phone calls as letters and telegrams, and the Bell System, as we've been reminding ourselves for years, has always been in competition for the consumer dollar with companies selling everything from irons to automobiles. But what business hasn't? Ours has not been competition in the sense that most American companies view it. Instead, the Federal Communications Commission and state commissions have served effectively as a check and balance.

But now the telecommunications business has both regulation *and* competition. It is still not the rigorous "hot pursuit" throughout-the-product line sort of competition that, for example, Ford knows from Chevy, Magnavox gets from Zenith, or Gulf feels from Shell. But the Bell System is feeling competition, new and pressing and growing, nonetheless.

It is seen, for example, in the race to build and sell customer provided switching equipment to business communications users. And nowhere is the Bell System response so determined as in Denver, Colorado. There, on a windswept knoll facing the dramatic front range of the Rocky Mountains, a different kind of Western Electric manufacturing facility is nearing completion. Its purpose is to meet and beat PBX competitors with better products and faster delivery dates.

The permanent plant is still not finished. Yet, together with a nearby temporary building, the sprawling facility is functioning like a thing alive, and the Denver idea is working. Housed side by side under one roof, personnel from Bell Labs, Western Electric and AT&T are developing, designing, manufacturing and marketing a totally new line of PBX's in as little as 18 months, as compared with six to eight years required before the Denver idea was born.

Teamwork among the Labs, Western Electric, the Associated Companies and AT&T has always been a fundamental and widely heralded source of Bell System success. This structure, and the professional interplay it has promoted among its corporate members, has perhaps contributed more than anything else toward making the Bell System unique among industrial organizations throughout the world. But even the Bell System has never worked together the way it is working together today in Denver.

The Denver idea is that people don't work for AT&T or Western or Bell Labs so much as they do for the Bell System. Because of an individual's expertise, he will be moved into town from any section of the System. But once he's there he's part of a new kind of Denver democracy, dedicated to outperforming the competition in the rapid delivery of personalized PBX consoles and other customer equipment.

Bell System work has never been humdrum, but in Denver people from the Labs, Western and AT&T are finding it both more fun and more productive to wage combat against a common competitive foe than with one another. As AT&T vice president Sam Bonsack has said, ". . . I have a hunch that, in the process [of developing the Denver idea around the System], a lot of old myths about prerogatives and petty responsibilities will get washed away."

There is something about intercorporate competition that binds people of a company together in common purpose, makes the individual and collective sap rise, starts the adrenalin surging. Competition gets men and women up on their toes, and in a forward frame of mind—not just those making PBX units in Denver, but traffic operators in Washington, installers in New Orleans, and people along the ringer assembly lines at Indianapolis.

That this business *has* performed and progressed well over the years without the spur of competition in the free market sense, was documented early this year when the System installed its 100 millionth telephone. Five years ago this month, in cooperation with the independent telephone companies, the Bell System commemorated the installation of the *nation's* 100 millionth instrument. But in many ways the comparatively quiet more recent milestone was even more significant, because 100 million Bell System telephones seemed to sort of flesh out the bones of "universal service" within the nation that Theodore N. Vail, AT&T's first president, had set as an objective back in 1908.

Not that the job is anywhere near done. On the contrary, the bones continue to grow—sometimes faster and at different angles than anticipated—and so the task of giving service expands with the need. By the end of the 1970's, for example, Bell System telephones are expected to climb to 150 million. The System will grow and get to that goal not *despite* its new competitors but, more probably, *because* of them. If an organization is tops at what it does, it can only thrive against its rivals. That is the law not of averages, but of being the best.

Bell
TELEPHONE MAGAZINE

VOLUME 51 NUMBER 4 JULY/AUGUST 1972

2 **It Takes Dollars to Do the Service Job**
By William G. Burns
An in-depth look at the inter-relationship of earnings and service in the Bell System.

8 **To Market, To Market . . .**
By Nicholas J. Mammana
A description of the Bell System's new Marketing Research Information System, the world's largest consumer data base.

12 **Vandalism: An Act in Search of a Cause**
By Professor Philip G. Zimbardo
Is the damage done by vandals really irrational, wanton and senseless?

18 **Women in Management**
A look at the changing role of women managers in the Bell System.

24 **A Time of Decision**
By John D. deButts
AT&T's chairman of the board discusses the present state and future of the business.

30 **Telstar Is Ten**
The age of the communications satellite began only a decade ago.

John D. deButts
Chairman of the Board
Robert D. Lilley
President
William L. Lindholm
Vice Chairman
Frank A. Hutson, Jr.
Secretary
John J. Scanlon
Treasurer

Tim H. Henney
Editor
Al Catalano
Art Director
Donald R. Woodford
Managing Editor
Thomas J. Fay
Associate Editor
William P. Kuhs
Associate Editor

Published by
American Telephone
and Telegraph Company
195 Broadway,
New York, N.Y. 10007
212 393-8255

It Takes Dollars To Do the Service Job

Good earnings and good communications go together like two peas in a pod. But some of the pea crop is drying up.

by William G. Burns

It has been said that growth is the only evidence of life. Judged on that basis, the Bell System is very much alive. Its growth rate on average has been twice that of the national economy since the end of World War II. During this period, the System has raised 90 per cent of the $50 billion now invested in telephone plant and equipment. The goal of universal service has for all intents and purposes been achieved. The future looks equally growth-oriented: forecasters currently expect the Bell System construction program to grow at about 8 per cent annually throughout the 1970's.

There have been some growing pains in the process, but by and large we have met our commitments and established a record of achievement unparalleled by any industry, regulated or nonregulated. However, such successes have led some to believe that the Bell System is somehow above the economic realities of life. The hearing examiner in the F.C.C. interstate rate case, for example, referred to the System as a "Rock of Gibraltar." Somehow the costs associated with large capital requirements in an inflationary environment are seen as not completely applicable to us. For example, it's been said that:

- AT&T never failed to raise new capital needed for construction programs.
- The company never had a bond offering or an equity issue fail.
- While there are some specific service problems, service in general has been expanded and improved.
- The System has been able, in the past, to absorb annual increases in inflation of two to three per cent through increased productivity, improved technology, cost reduction and crisper management.

The whole process is somewhat akin to taking a superb stallion and increasing his handicap by 10 pounds every race. When he keeps setting track records, it gives the impression that there's no limit to the load he can carry. However, there *is* a limit. The horse *will* weaken and eventually falter.

The myth of System financial invulnerability is in one sense a tribute to past successes in attracting capital; but complacency is out of place in today's economic environment. Our anticipated requirements for outside capital are sizable; the $4 billion plus we will need each year for the next several years is perhaps 15 to 20 per cent of the total external financing needed by all U.S. corporations. The flexibility that has always been an objective of Bell System financial policy has eroded in recent years as we've added increasing amounts of debt capital and been unable to attract new common equity capital. Restoration of our financial flexibility requires that we take a fresh look at both our objectives and the resources available. Thus, we need to consider the answers to several questions:

Financially where are we today?

Where should we be tomorrow?

What level of earnings will get us from here to there?

Today–Where Are We?

Changing economic conditions have had a marked impact on the Bell System's financial posture over the past several years.

Consider the following:

- In the early and mid-1960's inflation was running at about 1 to 2 per cent annually. By 1969 this had advanced to more than 6 per cent. Today the rate of increase is still around the 4 per cent level in spite of wage and price controls.
- This inflationary surge has had a profound impact on the cost of debt capital. The going rate on seasoned corporate issues increased from a 4.5 per cent level during the relatively stable 1960-1965 period to the 8 to 9 per cent level in 1970. Today interest rates remain well above historical levels at about 7.5 per cent—with no indication of any significant declines in the future.
- The cost of equity capital has also increased. It is an elementary principle of finance that equity costs exceed those of debt. Since debt is senior in claim on assets and income, the equity holder bears most of the risk, and expects higher returns as a consequence. With debt costs rising, it's not surprising that equity costs have risen, too.
- Inflation has drastically affected both the level of our expenses and the size of our construction program. Wage settlements pyramided, for example, from increases of about 4 per cent in the early sixties to 8 per cent in 1968; then doubled again in 1971, as the increase in total compensation soared 16 per cent. Similarly, the $7.6 billion construction program in 1971 would have been some $2 billion less in terms of 1965 dollars.

The confluent effect of these changes on the overall financial situation is reflected in several key financial indicators: debt ratio, interest coverage, credit rating, and the market action of AT&T stock.

Over the past half dozen years the Bell System's *debt ratio* (the proportion of investment in the business which is debt) has been on the rise, climbing from 33 per cent in 1966 to about 46 per cent today. Initially we were deliberately moving to increase our debt ratio in order to bring our capital structure into line with the norms associated with current financial economics. The intent was to move up to about 40 per cent debt and then to test our ability to successfully market and carry a still higher proportion. Events forced our hand, however. While we would have preferred a more tentative and gradual exploration, the depressed price of AT&T stock precluded the sale of common equity. Consequently, the forced heavy reliance on debt financing has increased the proportion of debt in our capital structure very close to the limit considered prudent.

A concurrent effect of the increase in debt ratio and the high interest rates that accompanied the added debt has been a sharp decline in our *interest coverage*—the number of times interest requirements are covered by total income. The measure of "times interest earned" is a key indicator of financial health for capital-intensive industries like utilities. If we consider our position relative to that of the highest-rated electric utilities, a marked deterioration in both absolute and relative position is evident.

In the early 1960's the Bell System had an interest coverage substantially above that of the electric utilities. Since 1966 there has been a decline in coverage for both, but ours has been much steeper, so that today there is no gap. As recently as 1966 System earnings "covered" our interest payments more than six times after taxes; today the figure is less than three times.

Both debt ratio and interest coverage impinge on a third key indicator—*credit rating*. The credit rating of a bond is a major determinant in both the cost and availability of long-term debt. Lower-rated bonds pay more in interest charges because the risk is judged to be greater. Cost differentials can be substantial, particularly in difficult markets. Equally important, lower-rated firms can find money difficult and perhaps impossible to obtain in periods of financial trauma such as we experienced in 1970. In that year, for example, nearly 90 per cent of the bond issues brought to market were rated A or above. (The ratings range from triple-A – the highest—down through double-A, A, and so on. The "high grade" classification generally refers to the two top groups—triple-A and double-A.)

Our deteriorating interest coverage and rising debt ratios have not gone unnoticed. Standard and Poor's recently downgraded New England Tel. to double-A. The reduction was attributed to a steady downward trend in fixed charge coverage, and the continuing need for considerable external borrowing. There is concern about other Bell companies, and additional downgradings are inevitable unless the unsatisfactory trends are reversed.

Perhaps the most comprehensive measure of the financial malaise affecting the Bell System is the *market price* of AT&T stock. The all-time high of $75 was achieved in July of 1964; since that time the price trend was generally downward through 1970, until it reached the low $40's where it still stands. This poor market performance is attributable to the sustained low level of earnings. AT&T has shown a continued level of equity earnings substantially below those of alternative investments, and has shown no evidence of improving that record. In fact, 1971 results in terms of return on equity were the poorest in 13 years. For much of the past two years the market price has been less than the book value per share. Today more than half of our shareowners find the current market price below the price at which they first bought their shares.

Tomorrow–Where Should We Be?

The vitality of our business must be linked with a continuing ability to earn adequately on the capital invested in the business so that our commitment to providing high quality communications service can be met. We want to do a superb service job. We need to fix service where it is not up to standards, and make sure that throughout the country the ability to provide service tracks with and anticipates customer demand. This is especially critical as we gear up to meet competition in many areas of our business. Without good earnings, we can't provide good service and without good service, it is difficult to expect good earnings; when one suffers, both do.

Looking to the future, we must restore in full the financial strength and flexibility that has been so important throughout AT&T's history. Our goals in this area are clear: we must maintain our high credit rating, restore some borrowing margin, and stimulate an upward trend in the market price of our stock.

It is essential that the Bell System maintain its triple-A rating. The frequency and volume of debt issues to be marketed in the years ahead require that we maintain a top-flight credit standing. This is *not* simply a provincial wish on the part of the financial officers to have things comfortably in hand, but rather, it is a very practical need.

We are advised on all sides by the investment banking fraternity that only the possession of a triple-A rating permits debt financing on the scale the Bell System must employ across the wide range of market conditions.

The combination of a household name and the highest credit rating gives us access to the broadest possible markets. In 1970, for example, Bell System issues sold relatively well in a very difficult market. In large measure that success was a result of appealing to large numbers of individuals who had been attracted by high yields into a debt market that usually is concentrated among institutional buyers. On many issues that year we sold one-third to one-half of the offering in lots of one, five, or ten thousand dollars to individuals. In addition to narrowing the market, any downgrading would, of course, increase our costs and affect the value of all debt currently outstanding.

Protection of the company's high grade rating in the future goes hand in hand with restoration of some borrowing margin. The decision as to what our goals should be in this area must consider the element of risk associated with this business. We see the risk as being somewhat more than that of high grade electric utilities. The rating agencies are generally in accord with this view. Consequently, if AT&T is to achieve rating parity, we ought to strive for a somewhat higher level of interest coverage than that of the high grade electrics. This is particularly important when, as is the case currently, our debt ratio is on the high side of the 45 per cent target considered appropriate for operations under today's economic conditions. In the case of "times interest earned" we must certainly aim for an improvement over the 2.8 times achieved in 1971; something on the order of 3 to 3.5 times is a minimum goal for the years ahead.

The key to such improvements is to restore our ability to successfully market common equity capital. This means restoring investor enthusiasm for AT&T stock. We've been forced to temporize somewhat in our financing program because of an inability to sell new shares on favorable terms.

The sale of equity at a price below the book value per share—the situation over the past several years—would result in a negative effect on the growth in earnings per share. It would be disadvantageous to the shareowners to have to sell rights under these circumstances and generally would not attract investor support. To avoid this, we've employed several innovative approaches to raising capital.

The first of these was an equity-oriented offering of $1.5 billion which AT&T made to the public in April, 1970. Since conditions were not right for a direct stock offer, the securities consisted of debentures (debt) with warrants (a sort of future "call" on shares of stock at a fixed price). Each debenture carried two warrants to buy—until May, 1975—common stock at $52 a share. The warrants, deriving value from future expectations of investors, served to make the debenture issue attractive. It will be necessary for the price of AT&T common stock—which has been in the $42 to $43 range lately—to take a substantial turn for the better over the next three years to insure exercise of these warrants.

The debenture-with-warrants offering was followed by two issues of preferred stock. Preferred is a hybrid security. It has some of the risk elements of common stock and some of the safety features of bonds. Like bonds, preferred pays a fixed rate of return on investment, and its payout takes precedence over the payment to owners of common stock. But like common stock, preferred represents shares of ownership in the business.

A total of $1.37 billion in preferred shares was offered to AT&T share owners through subscription rights in June of last year. As a special feature of the offering, the preferred shares are convertible into common stock at the rate of 1.05 common to one preferred.

Late last year, under a unique set of circumstances, AT&T placed $1 billion in non-convertible preferred stock and notes with a group of 17 large institutional investors, primarily life insurance companies. This accounted for a large part of the 1972 new capital needs at the AT&T level.

But it must be recognized that innovative financing has its limitations. We've about run out of rabbits to pull from the hat. Simply stated, we are very close to the point where we must obtain a substantial portion of our future financing in the form of common equity. It is clear that an improvement in earnings is required to make such an offering a feasible alternative.

There are two questions remaining:

What level of earnings do we need?

How do we get it?

How Do W
Get From
Here To Ther

Fulfilling our service commitment requires that we return the business to the track of year-to-year increases in profitability that has characterized most of Bell System history. Better earnings are essential, but how much better must they be? And if we know what we need to earn, how do we go about realizing that improvement?

Considerable thought has been devoted to the establishment of an appropriate earnings objective for the Bell System. This is particularly important for us because as a regulated utility we must be able to convince the regulatory agencies that our goals are reasonable. We feel that an appropriate earnings level should meet the following criteria:

- It should satisfy the "opportunity cost" concept wherein equity capital should achieve a return similar to that earned by comparable investments in both non-regulated and regulated industries.
- It should permit a rate of growth in earnings per share that meets investors' reasonable expectations—expectations which can be met by a wide range of other stocks.
- It should hold interest coverage above that of the high grade electric utilities.

These somewhat abstract guidelines can be more specifically quantified in the light of current conditions. The costs attributable to doing one thing rather than another stem from the foregone opportunities that have to be sacrificed. This sacrifice of doing something else is called *opportunity cost* and can be applied to the cost of equity capital.

The cost of equity for AT&T can be measured by considering the returns actually earned by equity capital invested in other companies. We looked at the returns on book equity available from a broad variety of companies over the past decade—a period encompassing diverse economic conditions.

In the ten-year period from 1960 to 1970 Moody's 125 industrial corporations earned an average return on book equity in excess of 12.5 per cent—the 50 largest manufacturing companies earned an average of 13.5 per cent. Standard & Poor's listing of 425 industrial firms, for the same period, showed an average return of nearly 12 per cent.

Looking at the electric utilities, the Federal Power Commission Class A and B electrics showed an average return on book equity during the decade of just over 12 per cent. The triple-A rated electric utilities averaged nearly 14 per cent.

Regardless of the group or time period, competition for investment capital has offered an equity return in the range of 12 to 14 per cent. That's the kind of competition we're up against when we try to attract the investor's dollar today.

Growth in earnings per share is another important factor in investment analysis and decision making. A review of market letters and discussions with institutional investors indicate that investors generally require annual growth rates in earnings per share for AT&T of 6 per cent or better. At our historic dividend payout level of about 60 per cent, equity earnings of 12 to 12.5 per cent offer a reasonable chance of achieving such growth in earnings per share.

Studies undertaken for the F.C.C. interstate rate case indicate that without a dramatic improvement in equity earnings, AT&T interest coverage would fall well below that of comparable electric utilities. At about the current earnings level of 9 per cent, our coverage would continue to decline in the future as the business added more relatively high priced debt. A level of equity return of 12 to 12.5 per cent was the minimum which would hold our coverage above the critical three times figure currently achieved by the high grade electrics.

In addition to equity costs, the Bell System must, of course, recoup its debt expenses. The current average cost for all of the debt in our capital structure is about 6 per cent. If we weigh these two cost elements with our current capital structure, and allow for the cost of our thin preferred equity, we arrive at the overall return required to meet Bell System objectives:

	Weighted Cost Component
Debt—45% at rate of 6%	2.7%
Preferred—4% at rate of 8%	.3%
Equity—51% at rate of 12.5%	6.4%
Total cost of capital	9.4%

Under present economic conditions an overall earnings level of about 9.5 per cent is urgently required. It is the minimum required to halt the serious downward trend of our credit worthiness. And it is the minimum amount required to regenerate and sustain the investor interest in AT&T stock that is essential if the System is to raise the capital necessary to meet the communications needs of its customers in the years immediately ahead.

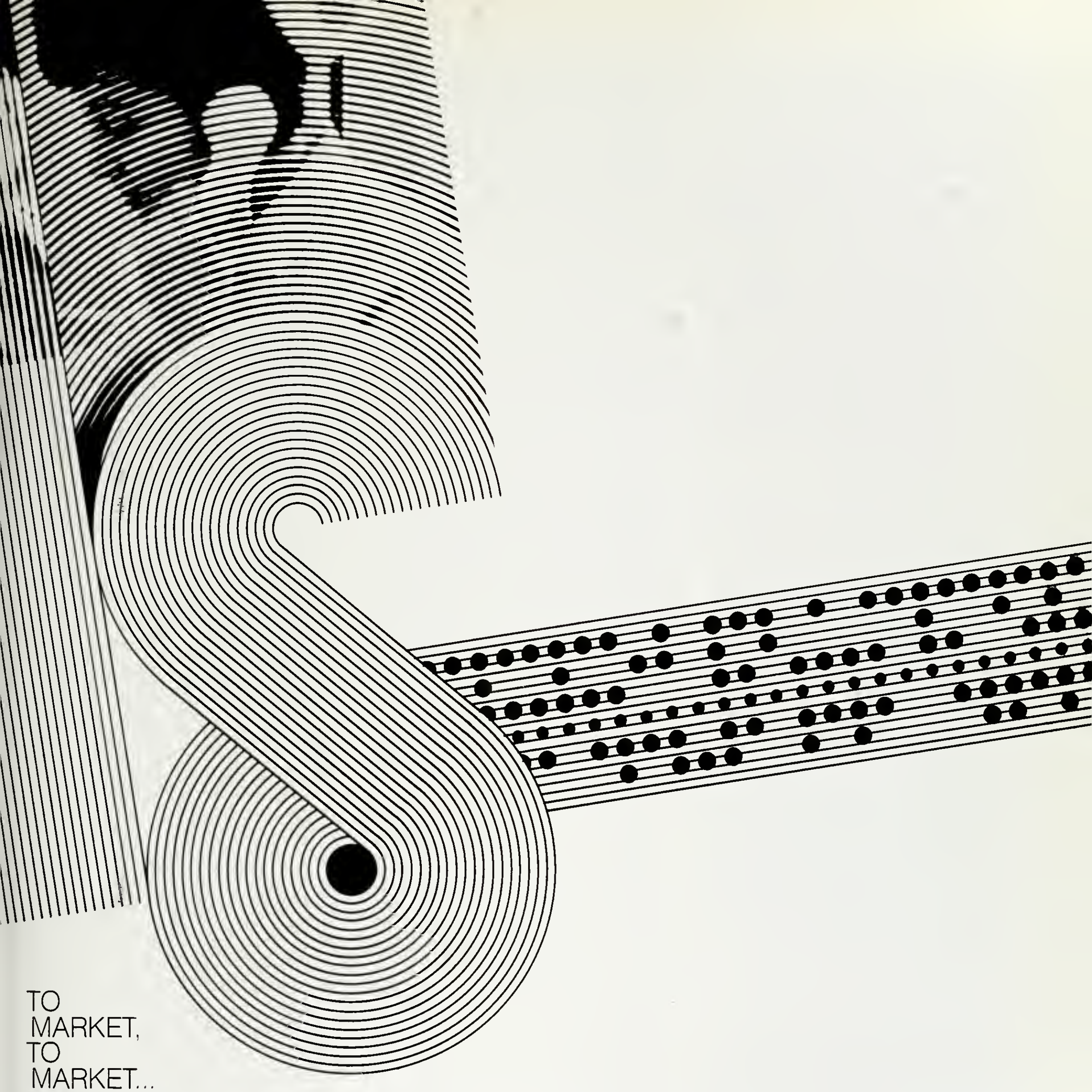
Knowing this objective, how do we reach it? We are striving to attain a good measure of earnings improvement internally. We are aggressively seeking out every opportunity for improved efficiency that new technology and new operating methods afford. And we plan to exploit whatever marketing opportunities exist to enhance the profitability of the business and the usefulness of our services to the public.

Such efforts can carry us only part of the way, however, so we have found it necessary to augment these internal efforts with applications for rate increases in both the intrastate and interstate areas. We are confident that the needed earnings improvements will materialize. Then we shall have the tools we need to fulfill our basic role—providing top-notch service.

An improved level of earnings is not an end in itself, but a means of fulfilling our current and future service obligations to the public.

Mr. Burns is Assistant Treasurer—Earnings Division, AT&T. A graduate civil engineer from Union College, Schenectady, N.Y., he joined New York Telephone Company in 1954. He served in Traffic, Plant, Engineering and Commercial assignments at that company before joining AT&T in 1968 as General Financial Administrator. He became Assistant Treasurer in 1971.

by N. J. Mammana



TO
MARKET,
TO
MARKET...

"**MRIS** IS, IN FACT, A SET OF ANSWERS AWAITING QUESTIONS"

Advances in the quality, quantity and capability of communications technology have been a hallmark of our industry for decades. Indeed, these advances, so significant in shaping our society, are so ubiquitous they are literally taken for granted. But profit to the corporation and customer satisfaction with communications have not increased proportionately. Any inquiry into this paradox inevitably leads to the marketplace with its inherent mysteries as a source of answers.

Determining what types of customers, and how many of them, want what products, at what prices, and when, is what marketing research is all about. Marketing research may be viewed in two parts, each a function of the nature of the inquiry and the required data source. When the research requirement is to determine why the customer does or does not buy, or what the customer wants or needs or prefers, the inquiry necessarily is directed at customers themselves. *Qualitative* market research is the generic name applied to market inquiries utilizing customer testimony as the principal data source. Should the marketing questions, on the other hand, focus on what products or services a customer selects, or how much he uses them, the researcher will tend to use *empirical* data to describe and analyze the customer's behavior. Only the more simplistic studies can be satisfied solely from one or the other data source. Comprehensive market studies require reference to both.

The Bell System has increased its market research capability substantially during the past several years. Most of the effort has been custom-tailored qualitative market research. Each of these studies requires special design, special data collection arrangements, special programming, special data processing and special analysis.

The consensus among marketing men has long been that the timeliness and quality of market studies must improve, that the costs of acquiring, processing and analyzing market intelligence must be reduced, and that the defensibility and comparability of market studies must be enhanced.

Recognizing this in mid-1966, AT&T marketing experts set about to obtain a broad-based, customer-oriented, marketing research information system focusing on "customer usage and motivations in the business and residence voice grade intercity markets." Implicit in this undertaking was the requirement to develop a methodology for data collection, storage and retrieval, validation and analysis. The nature and magnitude of this undertaking was unique and awesome.

Largest consumer data base

Comptrollers and marketing people from the associated companies and AT&T, scientists from Bell Telephone Laboratories and management scientists collaborated in the development of a basic design for the system. Now known as MRIS, and since the fall of 1970 part of the research section of AT&T's Market and Service Plans department, this system is the largest consumer data base in existence.

The sample is fundamental in the design of an information system intended to provide broad-based, empirical behavioral data economically. With customer behavior being evidenced by the customer's bill, the customer account naturally becomes the sampling unit.

The United States is divided geographically into about 100 Revenue Accounting Offices (RAO's). It is from these RAO's that monthly bills are sent to customers. Some cities house several RAO's because of their density, whereas several of the less populated states may share a single RAO. From each RAO, 300 residence and 300 business customers were drawn so that the MRIS data base contains detailed behavioral information on some 60,000 telephone customers.

Versatile sample

A file, established for each MRIS customer, is expanded each month to receive the latest month's data. MRIS, therefore, is best understood as a continuous panel. The analytic approaches required to assess continuous behavior such as toll usage are, to be sure, quite different from those used to assess one-time customer activity such as the selection of a wall set vs. a desk set.

The question of the adequacy of the sample size may arise when information is required to analyze the characteristics of rare, one-time customer behavior. For example, what is the profile of vertical equipment development of a Ph.D. couple with more than five children living in a mobile home in a given area? On the assumption that customers with such rare and specific characteristics may have commonality that transcends geography, every other RAO in the country can be queried for this type so that, while the sample size in a single RAO may not provide acceptable confidence, the larger sample will.

The MRIS data base excludes government accounts, company official accounts, coin accounts and centrex accounts, as well as information for private line, teletypewriter, telpak, audio and video and mobile services. For each of the customer accounts in the MRIS study, the following data are stored:

A basic equipment record consisting of service and equipment data such as number and type of lines, stations, premium sets and the like. These facts are revised when and if the customer changes service or equipment.

A billing amount record listing detailed charges on the monthly bill such as local charges, additional message unit charges, toll charges, taxes and the like. This record is expanded every month.

A long distance message record listing billing details for each toll message such as day and time of call, type of call, length of conversation and billed amount. This record is also expanded monthly.

A demographic record containing information provided on a questionnaire by the residence customer, such as age, marital status, occupation and education of the head of the household; age, sex and number of children, type of residence, and family income. The residence demographic file is completely updated every three years.

Some 100 million records

Although information on business customers is limited to class-of-business codes, certain additional information is collected such as types of PBX's, WATS usage, etc. There is, of course, information locating customers within RAO's and central offices.

All of the data are subjected to audit to assure their validity. Confidentiality and security of data are maintained by elimination of identifying data from the records and denial of access to any company's records without the permission of that company's MRIS coordinator.

As of today, the MRIS data base contains some 100 million records and it is growing at the rate of 3½ million records each month.

Thus the MRIS data base contains information describing each customer, in terms of his specific demographic or business profile, his equipment, service, location and usage. It is fair to say that this data base coupled with the data retrieval and analytic techniques that have been developed, impose a limit on the uses of the system that is dependent upon only the innovativeness and incisiveness of the questioner. MRIS is, in fact, a set of answers awaiting questions.

To date, MRIS has produced

three kinds of output. The first category, some 40 reports in all, are custom-tailored studies in response to specific questions posed by associated companies and AT&T departments. These range widely in nature and sophistication.

The second category of studies and output are largely concerned with the development and improvement of MRIS capabilities. They have to do with auditing procedures, analytic techniques and testing and development of better retrieval capabilities.

The third category of output consists of statistical handbooks of the markets. One is a publication listing of all of the business customers in the MRIS data base, categorized by associated company, industry and equipment configuration; that is, key, non-key, manual PBX and dial PBX. Within each category, data are provided showing the average size by lines, stations and billing amounts. Also provided is an analysis of the billing for these various types of customers. A similar handbook on the residence customer has also been published. The purpose behind the publication of statistical handbooks is to provide pertinent information for the broad audiences who use such data—engineers, marketing men, sales personnel and rate people.

Four categories

Another way to view the uses of MRIS is to categorize the work already done by the nature of the inquiry. There are four categories:

Behavioral Surveillance—studies have been made revealing customer behavior under varying economic and social conditions such as price change, change in the general economy and response to new or modified service offerings.

Market Segmentation—the MRIS capability to array customers in an almost infinite variety of ways and to profile these segments has been used to determine the potential size of markets. This in turn readily leads to quantification of undeveloped markets as they exist around the country. What this means is that the Bell System now has a capability to raise revenue by marketing activity, as well as by price change—and to raise this revenue by directing specific programs tailored to specific regions, specific services and specific types of customers. Reports are being made available to each company defining the revenue potential in their residence and business markets.

Special analytic capabilities

Forecasting—the MRIS data base contains information on a monthly basis going back more than three years. The forecasting capability is obvious. Moreover, forecasts may be made in sub-aggregations of whatever market segment is desired as well as the usual macro-market forecasts. The capability to forecast the business market, particularly by industrial type, permits the integration of outside economic indicators. This generates the capability to identify future market weaknesses in advance of the occurrence so that remedial measures may be taken.

Special Analysis—four companies are already developing intrastate toll-demand models using the data base to identify variables which influence demand and to determine the coefficients that should be applied to those variables.

The associated companies are the principal users of the special analytic capabilities of MRIS. A question such as: "What are the characteristics of highly mobile customers (short service life customers)?" can thus be answered. Currently MRIS is generating about one study a week in response to questions of this sort.

The data base which has been described should perhaps be called MRIS-POTS rather than MRIS. Design work is already underway for an MRIS-WATS and an MRIS-PL. This leads to a broader concept of MRIS: in substance the MRIS concept involves rigorous and uniform procedures for data collection, storage, retrieval and, to some extent, analysis. This concept is endorsed by AT&T's Comptrollers staff who have already asked their company coordinators to refer requests for customer account data to MRIS.

Currently all MRIS data is received and stored at the Piscataway Computer Center. The facility is being developed to permit on-line access and statistical manipulation by the companies through data terminals. It has long been known that the researcher, given the capability to manipulate data, greatly broadens and deepens the scope of his inquiry. As this capability increases, the future of MRIS will be greater.

Each associated company has an MRIS coordinator representing the marketing disciplines and a technical coordinator principally responsible for the technical aspects of that company's data. These coordinators deal with two groups in the Research Section of AT&T. One group, headed by Gwyn Williams, Marketing Manager-Systems, is located at the Piscataway Computer Center. This group is responsible for all aspects of data collection, storage, retrieval, processing and auditing, as well as the design of the existing and future systems. Dick Ellis, Marketing Manager-Reports, and his staff are located at AT&T and are responsible for interaction with the companies on all aspects of study requests, all analytic work and the publication of all MRIS reports.

Guidance and direction

The MRIS organization is autonomous. It contains within itself the analytic personnel, computer scientists and programming staff to perform its function. The computer hardware capability is furnished by the Treasury Department at AT&T. The daily interaction with associated company personnel as well as personnel from Bell Labs, Long Lines and AT&T provides guidance and direction consistent with the needs of the business.

The continuing evolution of MRIS is such that this article is likely to be out of date by the time it is published. And this is a good sign. For it foretells an increase in our capability to quickly, economically, precisely and objectively understand and serve our markets.

Nicholas J. Mammana is marketing director-research in AT&T's Market and Service Plans Department. He is a graduate of St. John's University and received a master's degree from New York University before joining New York Telephone in 1953. He assumed his present post in August, 1970.

Vandalism:

An Act in Search of a Cause

by Philip G. Zimbardo

The wanton destruction of public and private property has escalated to epidemic proportions — costing taxpayers and businesses hundreds of millions of dollars annually.. The prognosis is that it will get much worse unless we can make sense out of this apparently senseless violence against society.

My annual pilgrimage from the relative serenity of Palo Alto, California to the big cities of New York, Chicago, Detroit and others is instigated by an urge to recharge my life cells with the dynamism of their frenzied action, their discontented striving and free-floating sense of power. The cities are the symbol of man's conquest of nature, of his technological control over his environment. They are the center of communications, art, drama, fashions, high society, business and international politics. In short, they are where 20th-century man is at!

What a surprise then, to discover such cities besieged by a relentlessly advancing army apparently bent upon their destruction! Just as Rome had been sacked back in the year 455 A.D. by a Germanic tribe, the Vandals, so they seem to be on the verge of being overrun by their modern counterparts, the vandals. Against their impressive fortress of concrete, steel, police, security and assorted deterrents of all kinds, the vandals have chosen to go underground in order to wage guerrilla warfare against the citizenry. Hardly anyone ever sees a vandal, rarely are they apprehended and never are they captured in widespread search and destroy missions by the forces of good. But we do know them by their deeds—acts of property destruction which run into the millions of dollars in New York City alone, and perhaps into the billions of dollars nationwide.

A few years ago I became aware that the vandals were on the move within the city, but even so, I was not prepared for the extent to which their destructiveness could escalate in so short a time.

As soon as I got off the subway recently at Times Square, I planned to place a few business and personal calls before heading uptown to visit my parents in the Bronx.

Enter first phone booth. Dime in. No dial tone. Coin release handle broken off, so no coin is returned. Exit. Enter second phone booth. Mouthpiece dismantled. Exit quickly. Enter third phone booth. Seems to be all right. Dime in slot. But it stays there and does not drop down. The slot has been jammed. A struggle to get dime out. No use. Exit with anger.

The newsstand man refuses to

OPERATOR ASSISTANCE
"0" (Operator)
REPAIR SERVICE
611

change a dollar: "Whatd'ya think I work for da telephone company or somethin?" Enter fourth booth with *New York Times*, package of Chuckles candies, handful of change and, of course, two suitcases to be squeezed with me into the booth. This was a precaution so they would not be ripped-off if I left them outside, as happened to a former Stanford colleague on his way to his new post at Columbia University. On phone number four, the steel-braided wire covering the receiver cord has been unbraided and the cord neatly cut. Exit, with obscenities getting louder, more explicit and less under control.

At last, the joy of a phone in working order; number five is o.k.! My rage subsides. I'm actually talking to the first person on my list! I close the door as the subway roars into the station. But I notice my suitcases are resting in a puddle of urine. I cut the conversation short, open the door slowly, then in one deliberate motion punch the phone, kick the door and scream a dreadful curse upon the heads and the heirs of these telephone vandals. Some people nearby walk quickly away from the "nut" in the phone booth while I, now embarrassed as well as furious, run out of the station to find a phone that will do what it is supposed to do.

In short order, I learn the following: I cannot borrow my brother's car because its convertible top, slashed the night before, is in the repair shop; the guy at the car rental agency tells me not to leave my rented car on any expressway if it develops any trouble because, "They'll strip it blind inna halfin hour"; and I have to walk up five flights of stairs because someone has broken the elevator buttons in my parents' apartment house.

Every person I meet has a "can-you-top-this" vandalism story to relate. It is as though a bunch of kids out on a Halloween spree got tired of asking "Trick or Treat?," and decided instead that the trick would be their only treat.

One side effect of such experiences is a crawling social paranoia in which you begin to feel there is a personal element in this madness—these things are happening only to you and to yours. Fortunately, vandalism statistics are quite reassuring on this count; there is nothing personal about vandalism. In fact, there is everything impersonal about it. Consider some New York City statistics:

There are more than 200,000 school window panes broken each year (replaced at a cost of more than a million dollars). The public school budget must now regularly include an item of at least $3 million to anticipate the costs of destruction to the schools—not including fires, theft or loss from natural causes.

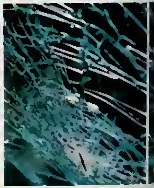
Destruction of seats, windows, doors and other parts of buses and subways amount to well over $100,000 annually. The damage to public parks, benches, rest rooms, playgrounds, street lights and fences continues its steady rise every year. Irreplaceable items such as rare trees and flowers and even park and zoo animals are now falling before the might of the vandals.

Nationwide rise in vandalism

One insurance company alone paid more than $4 million in auto vandalism claims in one year.

My experience with the vandalized phones is shared by many New Yorkers trying to use one of the 35,000 phones that are wrecked in an average *month*. The New York Telephone Company estimates that it spends about $4 million to repair the phones that have fallen into the hands of vandals.

While New York City may lead the nation in the extent to which its citizens suffer from acts of vandalism, by no means is the attack localized there. A carefully documented report to the California Legislature by an accounting firm developing new insurance plans for the California public school system, indicated that vandalism over a recent five-year period (1965-1970) cost California taxpayers $50 million. Of this total, $22 million went for direct costs of vandalism to the schools, $18 million for insurance against these acts and $10 million more on security systems, repairs and related losses. During this period, acts categorized as vandalism increased by 72 per cent, while glass breakage (in a separate category) went up by 123 per cent, and fires



were up 92 per cent. As a comparative figure, the increased loss from a natural cause, wind damage, was only 31 per cent (this due to more school property and greater repair costs over the years). This report also points out that vandalism exists in small school districts with fewer than 500 students, as well as in the large districts. It is also becoming as common in middle-class suburban areas as in lower-class urban areas.

The consequences of vandalism can be measured in dollars, reported in replacement or repair costs to local and national government as well as to the individual. It can be reduced to various sets of statistics of window panes broken, phones out-of-order, percentage increases and so forth. But the real costs of vandalism are much greater than our most exaggerated statistics reveal. When a high school machine shop or typewriting class is vandalized, the students may have to go for months without appropriate instruction. When a place of worship is vandalized (47 Christian churches and 20 synagogues were sacked within a recent six-month period in New York City), and its holy symbols defaced, faith in one's brother becomes strained, to say the least. When you can't leave a car in distress on a well-traveled public highway for fear it will be stripped, then it shakes the very foundation of an individual's social trust, the basis on which society rests. As anecdotes such as the following one increase, so does a sense of social anarchy—of each of us back in the jungle.

No apparent goal

A motorist pulled his car off the highway in Queens, New York, to fix a flat tire. He jacked up his car and, while removing the tire, was startled to see his hood being opened and a stranger starting to lift out his battery. The motorist began yelling, but the stranger tried to mollify his *assumed* car stripping colleague by generously offering, "Take it easy, buddy, you can have the tires, all I want is the battery."

How can we account for, or understand acts of property destruction in which there is no apparent goal, beyond the destructive act itself? If the coin container on a public phone is removed, that makes sense to us, the motive being theft of the money it contains. But when the coin container is not touched and the dial or receiver is smashed, then what is the motive?

When people put much effort into a destructive act or activity and get nothing out of it—it has no instrumental value—then that behavior is characterized as "motiveless," "irrational," "wanton" and "senseless." Indeed, these are the words uttered by the chief of police, the priest, the school teacher, my brother and the mass media in describing the nature of the vandal's deed.

Hard to identify

But where does this traditional analysis lead? It leads to a renewed outcry by a fearful public and vote-sensitive politicians for more law and order, better police protection, stiffer penalties, more arrests and less permissive courts. "Find the vandals, lock 'em up, throw the key away and the problem is solved." But in New York City, police make arrests in only about three per cent of all reported cases of vandalism. Remember, vandals do not wear distinctive uniforms which permit easy identification—often they are very cleverly disguised. (We shall soon see just how.)

Another approach to the problem is through better product design. Wicker seats are replaced with difficult-to-destroy molded plastic and Bell Laboratories is designing public phones with theft-proof coin boxes and other features of an integrated "indestructibility" design. This solution through technology may save some repair costs for the specific types of vandalism against objects that can be so redesigned, but will such efforts reduce or merely rechannel vandalism? Will the "soft side" of society, become even more vulnerable as technology eliminates hard targets of vandalism? How will we protect trees and flowers and books and all the fragile and delicate things we don't want to or can't plasticize?

Defining vandalism as senseless and motiveless crime contributes as much to the problem as do the destructive acts themselves. Such a definition has several interrelated negative consequences. First, vandalism becomes an effect without a cause, an entity without a reason for occurring. As such, almost all social scientists have ignored studying vandalism because it has become, by definition, "incomprehensible," and thus not amenable to scientific investigation through rational analysis of its causes. Then the burden is shifted from an analysis of the possible social, situational and environmental causes for these acts of property damage to an analysis of the irrationality of this presumably homogeneous group of social misfits—the vandals. The locus for vandalism is seen as in the deviant, sick, sociopathic heads of people identified as vandals. This "dispositional" analysis attributes evil deeds to evil people while ignoring social conditions which might facilitate those deeds in any of us.

It is easy to see why it is comforting to attribute vandalism to vandals and not to conditions which promote or encourage vandalism: 1) we are not responsible for such "sick" people, but we are responsible for "sick" social conditions; 2) vandals are inherently evil while we are good; therefore, we believe we would never do what they do; 3) the simple (if ineffectual) solution of isolating vandals in prisons and mental hospitals is preferred to the complex and costly solution of analyzing the social and psychological motives for vandalism.

Is vandalism really senseless?

I firmly believe, along with British sociologist Stanley Cohen, one of the few authorities on the subject, that most acts of vandalism make good sense to those who perpetrate them. It becomes our task to understand the logic and motives of the person who engages in the destructive act rather than deny rationality to a deed we could not imagine committing. Indeed, the "mindless," "meaningless" vandalism tag may be a technique to render illegitimate what is an act of social or political protest. In the 18th century a group of workers, the Luddites, smashed the new textile machines which threatened their handicraft occupation. Their "pointless" acts were stereotyped as "mad" and "frenzied" by proponents of the Industrial Revolution who were unable to perceive the distress and rage of these workers as legitimate human reactions.

Six distinct categories

Similarly, the property destruction which followed the racial disturbances in Watts, Newark and other places in the 1960's was reported to be "mindless"—by the white press. To the blacks involved and to the National Advisory Commission on Civil Disorders (1968), the damage was largely directed toward white-owned businesses characterized in the Negro community as "unfair or disrespectful toward Negroes." The same reaction is noted in research on school vandalism. The most likely targets are schools that are already run down, have poor morale among the staff and a high level of dissatisfaction among the pupils.

Cohen provides six categories into which we can sort acts of vandalism according to the personal significance that the destructive behavior seems to have for the individual who commits the act:

1. Acquisitive vandalism—Property damage done to acquire money or goods, such as breaking open vending machines or telephone coin boxes, stripping parts from cars or fittings from housing project heating systems.

2. Tactical vandalism—Property damage done intentionally to advance some other end, as a means to draw attention to a grievance or to force a reaction. Such a tactical approach is exemplified by prisoners who destroy their cells or the mess hall in protesting inadequate facilities or a man who breaks a store window to get arrested so that he will be institutionalized.

3. Ideological vandalism—Similar to tactical vandalism, but carried out explicitly to further an ideological cause. Anti-government slogans painted on embassy buildings or burning down R.O.T.C. headquarters are illustrative examples. Some recent "trashing" on college campuses was planned as a tactic to make the administration call the police onto campus, in hopes that their expected overreaction would then radicalize apathetic students and faculty. At some point ideological vandalism gets labeled "sabotage" or "treason."

4. Vindictive vandalism—Damage done to a selected target for revenge on its owner, guardian or representative. Sometimes a group of students demolishes a classroom because the students feel the teacher has been unjust.

5. Play vandalism—Damage to property in the context of a game: who can break windows on the highest level, shoot out the most street lamps, jam telephone receivers most ingeniously.

6. Malicious vandalism—Damage done to property as part of a general expression of rage or frustration. This vandalism may be indiscriminate but often is directed at symbols of the middle class, public institutions and anonymity-promoting systems, such as subways, schools, automobiles.

Symptomatic of dissatisfaction

We only obscure the search for causes and hope of a solution when we indiscriminately label many different types of property damage as vandalism and many different kinds of people as vandals. It well may be that one of the contributing factors in many instances of property damage is the very inability of those with the property to understand why those without it would or could destroy it. We could say with some certainty that telephone vandals will not be found among AT&T share owners. As an ex-con friend of mine aptly put it, "I'd much rather have money to invest in a bank than have to rob it to get some." From this perspective, property theft and property damage are forms of public expression that the have nots, the oppressed, the outsiders and the powerless use to vent their rage at what they define as the social injustice of their society.

A social analysis of vandalism leads to an analysis of what is wrong with life in contemporary America. It suggests that the extent of vandalism is a bellwether to judge the degree of social cohesion and the sense of social community that exists among all members of our society. What is frightening about vandalism statistics is that they are symptomatic of the deep-seated dissatisfaction of so many Americans in all walks of life with the way "things are going down."

In an effort to make sense of even malicious vandalism, we have begun to investigate the phenomenon first-hand, that is, by talking to people who have engaged in such acts and by arranging field studies to observe vandalism in the raw. The questions we posed were: What are the conditions which facilitate these so-called acts of vandalism, and what are the characteristics of those who decide to engage in this destructive behavior?

Anonymity fosters vandals

A colleague and I abandoned several automobiles either near the Bronx campus of New York University or at Stanford University in Palo Alto. Their license plates were removed and hoods raised to signal their "vulnerability." Observers hidden in nearby buildings watched, logged and recorded on film all those who came into contact with the cars. (The two areas were chosen not to show that one was better than the other, but rather because they typified the heavily-populated urban center as opposed to the less dense suburban setting.)

In New York, the bait worked beyond our wildest expectation. Within 10 minutes after the car was staked out, the first auto strippers appeared—man, woman and a boy about nine years old. The woman was the lookout while the man and child emptied the glove compartment and trunk; then the man gave the boy an instruction, the boy pulled a hacksaw from their own trunk, and the man used it to cut out the radiator. They also took the battery. This scene was repeated over and over during the first day as a steady stream of adults removed every conceivably removable part from the car.

Then the random destruction began, as others who were walking by or driving by stopped to inspect the car and then to violate it—slashing the tires, breaking the windows and lights and denting the hood, roof and doors with stones or metal bars.

In three days, this abandoned car was the victim of 23 separate incidents of destructive contact (a group or family attack counting as only a single incident). It was finally, after 72 hours, a battered hulk of twisted metal, broken glass, torn tires, ripped out seats.

We were truly surprised when we tabulated the data that revealed who was responsible for this destruction, and what were the conditions under which it occurred. Most of the "vandalism" was done during daylight hours, was often observed by passersby (who sometimes chatted with the auto strippers and smashers). It was executed by well-dressed, clean-cut, white adults who under other circumstances would be mistaken for mature, responsible citizens who demand more law and order to combat the rising tide of crime in their city.

In Palo Alto, the car went untouched for a week, except that one passerby lowered the hood when it began raining—"The motor shouldn't get wet."

It appeared to us that the greater sense of anonymity which exists in congested, metropolitan areas in part accounted for the observed difference. For many New Yorkers, their feeling of social anonymity is expressed as "they don't know who you are and don't care, and you don't know who they are and don't care." For the time being at least, there seems to be a greater prevailing sense of social consciousness, of social cohesion, of concern for property and people in the suburban locations.

Social conditions at fault

Our research and that of our colleagues indicates that the physical act of unthinking smashing, banging and breaking is very pleasurable in itself—perhaps as an alternative to our typical verbal, cognitive mode of behaving. For people who feel powerless, such physical acts of destruction are chosen because they have an effect upon some part of the environment, they are more readily acknowledged and more easily accomplished than constructive acts. Some acts of vandalism occur as a consequence of conformity pressures among peers ("don't be a chicken, smash the light") or through the vicarious learning of observing others engaged in the sport. In many cases, "vandalism" is not defined as the wanton destruction of property by the vandals themselves: for them, it is the excitement of the activity and not its ultimate consequence that motivates the act. Vandalism is facilitated by social conditions that increase boredom, that prevent constructive outlets for anger and protest and that deny the integrity and worth of every individual.

Must establish new values

For a society to function effectively, people must voluntarily agree to follow its norms which informally regulate mutual cooperation, reciprocity and trust. But people become indifferent to society's implicit rules, and even its laws, as they are placed outside of the reward structure of that society. Each person who is made to feel alienated from the mainstream of his society becomes a potential vandal. Each one of us who is made aware that property rights and laws exclude us becomes a potential vandal. Such a reaction is neither pathological or senseless; it is a human reaction to perceived social injustice. The solution then is not to call for more formal laws to deal with vandalism nor better law enforcement, but to try to understand why someone else does not have the same respect for property (for your property) as you do. You really can't expect them to respect your property more than the society respects their humanity and self-worth.

Vandalism is a rebellion with a cause. To prevent it, we must combat social indifference, apathy, isolation and the loss of community, neighborhood and family values. We must reaffirm the principle that human rights are more important than property rights and property rights are acknowledged by all only when all have a share in them.

Philip Zimbardo is a professor of social psychology at Stanford University and currently a fellow at the Center for Advanced Study in the Behavioral Sciences. He has engaged in vandalism as a youth, suffered personal inconveniences and expense because of acts of vandalism by others and recently has begun to investigate it through innovative experiments.

Women in Management

"There are no male and female problems in business; only business ones."

"If I were to be elected chairman of AT&T, I wouldn't want to be John deButts. I would still want to be Jane Voltz."

With that, Jane Voltz, general operations supervisor of Illinois Bell Telephone Company, comes close to providing modern-day woman's answer to Freud's famous question, "What does woman want?"

What woman wants, according to Miss Voltz, is social and economic equality while gaining her own identity and image. Miss Voltz's concern about identity has grown out of 31 years of experience in the Bell System during which she says some men—consciously or unconsciously—have attempted to reshape her in the male image. Miss Voltz says her experiences have not been such that she would become a rabid feminist. On the whole, she has found her career rewarding and has appreciated the confidence and help of many male managers along the way.

Similar sentiments were voiced by other women managers with service as long as Miss Voltz's to those with as little as five years.

While all of these women refused the label "woman liberationist" and objected to some of the extreme views expressed by the more militant feminist leaders, all applauded the efforts being made to gain equal treatment for the working woman.

The feminists, of course, would prefer a less passive attitude. One of the avowed goals of the movement is to "raise the consciousness" of other females, educating them about their rights and spurring them on to demand equality. Their aim is to demonstrate that women have been relegated to an inferior position through the cultural and physiological roles a male-dominated society has imposed upon them. By attacking the institutions which foster and perpetuate these roles, the feminists hope to free women from docile and uncritical acceptance of their lot.

Some skeptics, however, doubt that the feminist movement will ever fully succeed. Notable among these is the eminent sociologist Gerhard Lenski. In his *Power and Privilege: A Theory of Social Stratification*, Lenski contends that women who see too little progress among females in business will continue to choose the more attractive alternative of competition in the "marriage market" and the sometimes hectic world of the family.

"Despite the fact that modern feminists are often critical of this choice, they cannot ridicule it," says Lenski. "It offers as many opportunities for rewards as competition in the man's world, and the probabilities of success are far, far greater.

"By an advantageous marriage, a woman may obtain half interest in a very substantial income, entree to exclusive circles and leisure to do most of the things she wishes.

"Even a woman whose marriage is less successful by economic standards is usually provided with a measure of economic security and, after the child-rearing years, considerable leisure." Additionally, says Lenski, marriage also offers women the psychic rewards which business simply cannot.

"The feminists believe their strongest attack against marriage is that it is intellectually stultifying," says Lenski, who disagrees. He counters that the "same charge could, with equal validity, be made against most male occupations."

Stultifying or not, a great many women look on their working careers as a mark-time situation while waiting for Mr. Right to come along. This can be a bad mistake according to Ronnie Garvey, assistant manager, labor relations at Western Electric with 28 years' service. "A young woman who has the ability and doesn't use it shortchanges herself. If she uses each job as a steppingstone to jobs with more responsibility and prestige, she'll do better financially, she'll have more fun and she'll grow as a person. That's important, even if she does leave her job after she marries. And it certainly gives her an advantage if she later returns to the job world, either by choice or necessity. I've been a clerk and now I'm a manager. Believe me, being a manager is better," Miss Garvey says.

Ellen Murphy, an AT&T accountant with 28 years' service, concurs and says she is appalled by the seeming lack of initiative among the company's newer, young female employees. "They have such wonderful opportunities today. Far more than when I began my career. I'm genuinely distressed to see so few take advantage of the possibilities," Miss Murphy declares.

The feminists say it is business, not women, that is at fault. Male managers who hold stereotyped images of working women prevent them from rising higher in the business world, they say. How feminists view the solution to the problem appears to depend upon the degree of their radicalism. Radicals tend to see the problem as economic and seek a complete restructuring of society. More conservative feminists, however, view cultural attitudes as the root cause of the problem. Moderate institutional reforms or a change in male attitudes would be their solution. But all feminist groups agree that—with or without a revolution—some male attitudes must be changed.

Among the myths feminists say must be dispelled are:

A Woman's Place Is in the Home: The feminist viewpoint is that the woman should be able to make the choice. Beyond that, there is a question of whether or not some women can even afford to stay in the home. Labor Department statistics compiled in March, 1971, showed that almost 70 per cent of all working wives were married to men earning less than $10,000 per year and 40 per cent of them were the mates of men with less than $7,000 in yearly income. A further break-down of the incomes of husbands of working wives by percentages is as follows: $3,000 or less, 11 per cent; $3-$5,000, 12 per cent; $5-$7,000, 17 per cent, and $7-$10,000, 30 per cent. Only about 30 per cent of all working wives were married to men earning $10,000 or more. Feminist author Joan Jordan thinks this clearly indicates that those married women who do work "are doing so to help pay living expenses."

Women Will Get Married and Leave: The charge is true, as far as it goes. However, the Women's Bureau of the U.S. Department of Labor says that a majority of women are returning to the labor force after their children are in school, if not sooner. Despite this break in employment, says the Bureau, the average woman still has a worklife expectancy of 25 years, as compared with 43 years for the average male. Moreover, the single woman bests even the male's record. Her worklife expectancy is 45 years.

Sociologists also note that increasingly fewer women are marrying early these days, and when they do, many postpone having children for several years.

Another factor to look at is the quality and salaries of jobs offered females. The highest turnover, says the Women's Bureau, is among women in no-future, dead-end, low paying jobs in largely women-employing industries.

Women Are Absent Because of Illness More Than Men: That depends upon the category of the illness, according to the U.S. Department of Labor. A recent departmental survey shows that women are absent more than men for acute

> "A young woman who has the ability and doesn't use it shortchanges herself. If she uses each job as a stepping stone to jobs with more responsibility and prestige, she'll do better financially, she'll have more fun and she'll grow as a person."

illnesses (3.3 days as compared with three), but also are less prone than men to more chronic and disabling illnesses such as heart trouble, arthritis, rheumatism and orthopedic impairment. When absenteeism for both types of illnesses—acute and chronic—is taken into consideration, the male absentee rate is 5.4 days per year, as compared with 5.3 for females.

Women Don't Want Responsibility on the Job: The feminist retort is that "no one has ever asked us," and the Women's Bureau of the Department of Labor agrees. The Women's Bureau report states:

"Relatively few women have been offered positions of responsibility. But when given these opportunities, women—like men—do cope with job responsibilities in addition to personal or family responsibilities. In 1970, 4.3 million women held professional and technical jobs; another 1.3 million worked as nonfarm managers, officials, and proprietors. Many others held supervisory jobs at all levels in offices and factories."

In the Bell System, including Bell Labs and Western Electric, there are approximately 240 women in third to fifth level managerial jobs ——some 215 are third level; 21 are fourth level, and four are fifth level. Jean McConaughy and Ronnie Garvey are among the third level managers, Ellen Murphy is among a larger second level group, while Jane Voltz is one of the 21 fourth level managers.

In addition, AT&T and several Bell Companies have elected females to their board of directors. Miss Catherine Cleary, president of First Wisconsin Trust Company, was elected to AT&T's board on April 19. She previously was on the board of the Wisconsin Telephone Company. Cincinnati Bell Telephone has elected Mrs. Frances Poetker, a leading florist in that city, to its board. In California, a female physician, Roberta F. Fenlon, M.D., is serving on the board of directors of the Pacific Telephone Company.

Women Are Not as Mobile as Men: Top level corporate executives are finding that the mobility of female employees sometimes hinges upon the inducement given to move. If the offer is good enough, a husband and wife may agree to find a location between their jobs that will allow the wife to accept the offer. Sometimes the husband will take a new position in the new location.

Mrs. Ina Spady, chief operator for Pacific Northwest Bell in Seattle, said she would consider moving to another part of the country if the company requested it. Mrs. Spady has five school-age children and had been a full-time homemaker before joining Pacific Northwest three years ago.

Mrs. Spady, who before her marriage had been a lieutenant j.g. in charge of a Naval cryptographic unit, endorses the feminist movement. She credits Betty Friedan's book, *"The Feminine Mystique"*, with bringing her out of the home.

Prior to reading the book, Mrs. Spady tried to find an outlet for her energy in a variety of club, civic and charitable organizations. "The clubs just weren't my thing," she says. "What I really wanted was to work at a responsible job again.

"Would I consider moving? If the company could show me that by accepting the change I would further my career; and providing they would defray all relocation expenses, I would gladly consider moving," Mrs. Spady said.

While such a change would mean disrupting an established home, relocating the children to new schools and the reestablishment of her husband's business interests, Mrs. Spady saw none of these as insurmountable obstacles to the proposed change.

An AT&T task force set up in 1970 to study the utilization of females in management found that "mobility, though desirable, is certainly not as much of a requirement as in the past. This is particularly true in larger urban areas where a manager can spend an entire career in the same vicinity."

Men Resent Female Supervisors: Again the Women's Bureau contends that this is not a proven fact. "Most men who complain about women supervisors have never worked for a woman," the bureau says. "In one study where at least three-fourths of both the male and female respondents (all executives) had worked with women managers, "I hope that male employees will not resent females moving into jobs for which they are qualified. The Bell System is certainly large enough to provide managerial opportunity for qualified persons of both sexes."

their evaluation of women in management was favorable. On the other hand, the study showed a traditional/cultural bias among those who reacted unfavorably to women as managers."

Uprooting these "cultural biases" will be difficult because of the solace and comfort they provide the threatened male, says the Illinois company's Jane Voltz. They permit him to set standards for female behavior, then offer those same standards as proof of feminine shortcomings, she contends.

The male view about female absenteeism is a case in point, Miss Voltz says. A male manager finds it perfectly acceptable for a woman to stay home and care for a sick child, Miss Voltz says. ("That," she says, "fits his view of the feminine role.") In turn, though, the same man will deny the same female a raise in salary or a promotion because of lost work days.

Miss Voltz believes that it will be easier to attain equality by changing institutional practices rather than male attitudes. Western Electric's Veronica Garvey agrees, citing her own career as an example.

"The Bell System, although somewhat more enlightened than most businesses, cannot help but reflect the general attitude of society toward working women. I had more than 20 years' service before I got my first supervisory position. Men with similar experience and background were moved along a lot more quickly. I don't think I harbor resentment, that's just the way things were in those days.

"Last December's Labor Department Directive, which applies to all large companies holding Federal contracts, requires that an 'Affirmative Action Program' be drawn up to remedy the 'underutilization' of women in the work force. This one stroke will do more for the working woman than all the feminist demonstrations, talk-shows and articles rolled together," Miss Garvey says.

Jean McConaughy, assistant secretary of benefits for Long Lines with 30 years' service, agrees that the law will continue to have a very visible impact on the Bell System as more and more women attain management positions and prove their capabilities at the jobs. "I hope that male employees will not resent females moving into jobs for which they are qualified. The Bell System is certainly large enough to provide managerial opportunity for qualified persons of both sexes," Miss McConaughy says.

Other institutions must also change, according to Miss Voltz. For example, social restrictions used to prevent females from becoming commercial managers in the Bell System. The argument against female commercial managers was that they would not relate well with male city officials and could not join all-male service clubs such as the Kiwanis, Lions, Optimist or Rotary, Miss Voltz says.

She notes: "We are providing substantial financial support for more than 300 of these all-male organizations and I think that support had better be withdrawn until these clubs are opened up to women."

Miss Jean Porte, a former high-school teacher now an assistant statistician at New Jersey Bell Telephone Company, doesn't resent the all-male service organizations, pointing to the existence of such all-female organizations as the American Association of University Women, the League of Women Voters and the organization of which she is New Jersey State Chairman, the Junior Women's Club.

While New Jersey Bell doesn't pay her dues to the organization, the company does allow her time to attend the Club's conferences and special meetings.

"It works to our mutual advantage," Miss Porte said. "Seldom does a meeting go by where I am not called upon to explain or defend some action taken by the company. In turn, I get a great deal of personal satisfaction from representing some 4,500 New Jersey Club Women as their state chairman," Miss Porte said.

In her six years with New Jersey Bell, Miss Porte has been twice promoted, so she does not feel her outside club activity interest has retarded her career progress.

Within the Bell System, however, Jane Voltz sees an inability on the part of most managers to envision women rising above the first level of management. "They hardly ever see a woman as their boss or successor," she says matter-of-factly.

A 1970 AT&T employee utilization task force concurs. It found that there are almost an equal number of male and female managers at first level. But it noted that—all things being equal—the chances of a first level male manager reaching district (third) level are about one in four, while the odds for a female attaining the same level are about one in 300.

Because of such low expectations for female employees the committee found that women have rarely been taken into consideration in manpower utilization plans. Nor have females generally been given the special training and rotational experience needed for advancement. Thus the typical career pattern for a Bell System female employee has been an initial assignment in a "terminal line" or "staff" job and a horizontal "promotion" into a "staff specialist" position. Rarely have females advanced vertically into management jobs.

Many of the committee's recommendations for resolving these inequities have been incorporated into the company's Affirmative Action Program. Included among these were proposals for increased recruitment of females on college campuses, inclusion of women in special management training programs, identical assignments for male and female managers during their early years, and rotational assignments for women.

These, of course, are only a few of the committee's recommendations and do not begin to represent all of the steps the company is taking under its Affirmative Action Program to insure equality for women employees. On May 1, 1972 each of the Bell System companies filed individual Affirmative Action Programs with the Federal Communications Commission. The program objectives include numerical goals and timetables each company will follow to insure that the race and sex profile in 15 major categories resembles the race and sex profile of the company's relevant labor pool.

To insure that the objectives of the Affirmative Action Programs are met, each manager at every level of the business has been informed that he or she will be held accountable for achieving the program's goals. If the company determines that a manager discriminates against an employee because of race, sex, religion, national origin or age, that manager will be subject to appropriate disciplinary action (up to and including dismissal), depending on the severity of the case.

Corporate policy alone will not erase all inequities and prejudices, according to AT&T's Ellen Murphy. "Unless the woman applies herself diligently she can easily be overlooked in a large corporation," Miss Murphy says. Concurring, Jean McConaughy says, "The Bell System is something of an unwieldy giant; you won't get attitudes to change overnight. It takes time."

Jane Voltz says the female manager cannot always afford the luxury of being the "retiring, non-aggressive female that men idealize."

"For example," says Miss Voltz, "a male manager simply has to call someone with a request and usually it will be done. But when a female manager makes the same call she has to identify herself by name, rank and serial number and make it pretty clear she intends to have her request fulfilled."

Miss Voltz also laments that despite all of her efforts she has not won complete acceptance. Few male managers, she says, invite her to lunch to discuss solving a problem. That dismays Miss Voltz. She says that "there are no male and female problems in business; only business ones." If the men say that much significant decision making takes place at lunch or at social gatherings, Miss Voltz says women should not be excluded.

Ellen Murphy, Jean McConaughy, and Ronnie Garvey agree with Jane Voltz when she says, "We must ungender a lot of jobs. The day must come when we don't think in terms of whether a man or a woman can be president of AT&T, but whether the best person is selected."

And John deButts was not being facetious when, at the Annual Meeting in Denver, he said ". . . a woman may well be addressing you [the share owners] from this podium some day."

"A male manager simply has to call someone with a request and usually it will be done. But when a female manager makes the same call she has to identify herself by name, rank and serial number and make it pretty clear she intends to have her request fulfilled."

A TIME OF DECISION

BY JOHN D. DEBUTTS

THE NEW MANAGEMENT TEAM WILL MAKE A DIFFERENCE.

This article is drawn from remarks which AT&T's Chairman of the Board, John deButts, made in May to several Associated Company management groups and to participants in the Bell System Presidents' Conference. In it, he discusses the present state of the business and examines its future prospects.

Last April in Denver—just 19 days after I assumed my new job—I made some quite explicit pledges to our share owners on behalf of the Bell System's new top management team—pledges with respect to service and earnings and our response to competition. Redeeming those pledges depends in very large measure on you.

You, like our share owners at Denver, are probably wondering what difference it is going to make now that a new cast of characters has taken its place at the head of the Bell System. At the outset let me say to you what I said to our share owners—and that is that the new team that took office on April 1 *is* going to make a difference. It is our *job* to make a difference—just as it was Hi Romnes's job to make a difference in *his* time, and Fred Kappel's in *his*. As you may recall, a number of publications greeted the announcement of our election with patronizing observations to the effect that all Bell System managers are cast in the same mold and therefore there are scant prospects for change in the System's accustomed ways. Those publications are going to be proven wrong—and we look to you to help us prove it.

So what I would like to do hereafter is to share some thoughts with you about some of the forces at work on our business that directly challenge AT&T's new management team as it takes up its duties. I shall leave it to you to discern from what I say the difference that I—with Bob Lilley's help and Bill Lindholm's—hope to make in the months and years ahead.

As you can well imagine, the most immediate challenge confronting me on my new job was the conduct of an Annual Meeting that would require me to stand up in front of our share owners in the full knowledge that more than half of them paid more for their AT&T shares than they could sell them for today.

What could I say to them? What could I say that would strengthen their confidence in the management of the Bell System and support their hopes for the investment they have in it?

I am sure you recognize that share owners haven't been hearing much good news from us—certainly not during the past two years in which we reported earnings results that we described in our own words as "essentially flat." For some months we had been holding out the hope that—with a turnaround in the economy—our business would once again resume its upward course. But, as each succeeding quarter passed without evidence of an earnings improvement, our expressions of hope began, I am afraid, to sound a bit hollow.

Then, before the meeting in Denver, there was better news—evidence that the economy was on the move again and that our business was moving with it. Preliminary results for March, since confirmed, enabled me to tell our share owners that—in terms of the number of telephones the Bell companies added and the increase in the number of long-distance messages they handled—January, February and March were significantly "better" months than their equivalents last year. The same results also suggested significant, progressive improvement—that February was better than January and that March was better still. Actually, March telephone gain was 44 per cent ahead of last year and the first quarter, up 35 per cent, was the highest on record. (April gain, incidentally, was not quite that strong, but it, too, outpaced January and February.)

Of course share owners—most of them anyway—don't look at station gain and message improvement; they look at earnings per share. I was able to report some improvement in that category as well. It wasn't much—just a penny a share better than last year—but nonetheless a significant improvement because it was achieved in the face of much higher costs than we experienced last year. In short, I was in a position to advise our share owners that we are beating our "budget," a budget that is explicitly aimed at achieving a significant improvement in earnings per share during this year.

I DO NOT DESPAIR OF REACHING OUR 1972 EARNINGS GOAL.

At the same time, however, I felt obliged to tell our share owners that meeting this objective depends on our ability to show continued good progress in repricing our services at levels that reflect their cost and value today. The stark fact of the matter, insufficiently recognized even in our own business, is that the earnings improvement we expect to produce this year depends in very large measure on rate increases that have yet to be authorized—increases that, by my calculation, would contribute some 25 cents a share.

Now that doesn't mean I despair of achieving our 1972 earnings goal or that I am ready to adjust to what some might feel is more "realistic." I am not. I'm not agreeing to reduce our 1972 earnings objective by one penny. In fact, on the basis of the results so far, I have been wondering whether we shouldn't raise that objective a bit! Nonetheless we still have a doubly difficult job to do. Meeting our objective requires that we continuously sharpen the effectiveness with which we tell our story to commissions *and the public*. Let me emphasize "and the public." For the main thrust of our task, it seems to me, is to create a climate of public opinion that will make it politically feasible for commissions to come up with findings of the dimensions that making service progress requires. We have a good story to tell, and while I don't expect the public to stand up and cheer for rate increases, I do think it is ready to admit the reasonableness of our needs against the background of the good fight we have fought against inflation over the years—*if* we tell our story right and in straightforward language that they can understand.

Now I don't want you to go back to your organizations and tell your colleagues that John deButts said earnings are number one in '72. Service still comes first. And if you need proof that it does all you need do is contemplate that whopping $8.5 billion we are spending on construction this year. Remember, though, that financing construction on this scale—and the even larger scale of the years ahead—depends on our ability to show year-to-year earnings improvements commensurate with alternative investment opportunities. I just do not want to think about what will happen to the Bell System's service capabilities should we content ourselves with the flat earnings performance we have shown for the past couple of years.

To put it all together, then—we simply must get the Bell System's earnings moving up again. We must in 1972. I know we can. I know we will.

NO ISSUE HAS STIRRED MORE DEBATE THAN THE QUESTION OF COMPETITION.

Now you might think that achieving our 1972 earnings objectives represents a sufficient challenge for one year. As it happens, though, we have some other challenges that won't wait for us to get our economic house in order. Let me cite only three.

We have, first of all, the challenge of competition and the test of our technological and marketing capabilities that competition poses. I have every confidence in those capabilities. But competition demands of us what may be a harder task—and that is a thinking through of our service offerings, our pricing policy, even our organization structure, in the light of changed and still changing conditions in the communications market.

Competition, as I am sure you recognize, is a topic that is much on our share owners' minds these days. They wonder about what competition will do to their investment. They wonder about our ability to compete back. Here's what I had to say to the share owners on the matter at our Annual Meeting.

I started out with the observation that, among the issues currently agitating the field of telecommunications, none has stirred more intense debate or proliferated more pages of testimony than the question of whether the telephone business ought to be opened up to competition and, if so, how. At the same time I said that it appeared to me that, intense and protracted as this debate has been, the general public is only dimly aware that regulatory decisions already taken in its name have the potential for radically altering the way telephone service has traditionally been provided in these United States and the way we pay for it. I admitted that perhaps in some measure it is our own fault that the public hasn't taken much of an interest in these matters. We just haven't made the issues plain. If that is the situation, we have, I think, a responsibility to correct it. For I submit that the public *should* know about—and have its say in—decisions with respect to so fundamental a service as communications. When all is said and done, it is the public that will bear the consequences of these decisions. And it is the public that will pay the price.

I told our share owners about the MCI decision and what it might mean should competitive necessity require us to abandon the principle of nationwide average pricing.

And I told them about the Carterfone decision and the prospect that still further liberalization of interconnection policy could further erode the long-standing principle of single company accountability for the service it provides.

I raised these questions, I told our share owners, not because I have any doubt about the Bell System's ability to give a good account of itself in the face of competition, but simply because it seems to me the real public interest has been insufficiently considered in the search for right answers. Admittedly the issues are complex. But inexorably the shape of the future of an industry that is vital to every American is being drawn on the basis of deliberations thus far largely confined to regulators and communications specialists. In these deliberations the "public interest" is constantly invoked as the touchstone of decision. But for the most part the public remains to be heard from. I think it is important that it should be before and not after decisions are made in its name that it may or may not like.

Finally with respect to competition in the field of communications, we need, I think, to be sure that what we are talking about is true competition and not simply a division of the market, arbitrarily imposed and artificially maintained. We need to ask ourselves whether the benefits classically attributed to competition—a quickened pace of innovation, a broader range of customer options and lower prices—would in fact flow from the introduction of competition in an industry universally recognized as unrivalled in technological innovation, an industry that has generated an explosive diversification of its services in recent years, an industry that has done a better job than any other that I know of in keeping prices down. And we need to ask ourselves whether the further expansion of competition in communications, whatever advantages it might bring to some, can be accomplished except at the cost of impairing the potential of the concept that has provided this country with the most highly developed communications system in the world—I mean the concept of a universal system, designed and configured to operate as a single integrated entity, its services available on equal terms to all its users, wherever they are, whoever they may be. And surely we need to ask ourselves what the impact of competition will be on the general users of communications service, the public at large, the small businessman, the people in our smaller towns across the nation.

Finally on this point, I told our share owners what I tell you now just in case there should be any doubt about it: We *are* going to compete. We are not going to abdicate *any* sector of our business—not the terminal area, not the private line area—where we are convinced —and can by our performance prove—we can do a better job for the public than anybody else. And, let me assure you, we will continue to fight against competition artificially imposed for the advantage of the few to the detriment of the general body of our customers.

IV

THE TIME HAS LONG SINCE PASSED WHEN THERE WAS ROOM FOR DEBATE ON AFFIRMATIVE ACTION.

Competition is one challenge. EEOC is another—or, as I would prefer to say it, we have the challenge of making sure that equal opportunity is a fact and not just a slogan in our business.

When the EEOC charges were first announced, most of us felt they were a "bum rap." I still feel that way. I still feel that we have been a leader in this area and ought to be congratulated rather than castigated. But we cannot let our resentment of those charges or our efforts to rebut them distract us from the more fundamental task of affirming through action our commitment of nondiscrimination in every aspect of our personnel practices. On this point I'll say only this: the time has long since passed when there was room for debate as to *whether* the Bell companies should commit themselves to affirmative action—including realistic, specified objectives—in assuring equal opportunity for minorities and women in every occupation and at every level throughout our business.

I am not so naive that I am not aware that personal attitudes vary on this matter and I know, too, that there are honest differences of view as to how our policy ought to be implemented. But one thing should be clear: it is the policy of the Bell System—north, south, east and west—to assure that every employee has a fair and equal chance to realize his full potential and to progress to the limit of that potential along any career path he or she may choose. That's the way I read the law of the land. More fundamentally, that's the way I read our country's purpose, a purpose we have a responsibility to help fulfill. And furthermore, that's what *I personally* believe is the right course for us. In short, affirmative action to achieve equal opportunity is a major factor in every Bell System manager's job—a factor on which he can expect to be measured on the basis of the *results* he achieves.

OUR BUSINESS EXISTS FOR NO OTHER REASON THAN THE SERVICE IT PROVIDES THE PUBLIC.

V

Finally, we have another challenge, one that is even more troubling than those I've cited and more difficult to define. Let me describe it to you in personal terms.

I trust you will think it only natural that I took some satisfaction from the fact that Hi Romnes chose to recommend me—and the Board of Directors to elect me—to head the business to which I have devoted my entire working life, a business that I happen to believe is a great business. I should tell you, though, that the good feeling one gets from a promotion has been spoiled somewhat for me by the "image" of the Bell System that a number of publications, including some not unfriendly to business, have chosen to project to the public in stories announcing my election. It is an image that doesn't conform to the character of the Bell System as I know it. Let me say right here and now that, if I have a priority objective in my new job, it is to change that picture.

I for one am convinced that the impression of the Bell System that is now being purveyed—of an outfit that is too big and cumbersome to be managed, an outfit that has lost its capacity for timely decision and meaningful innovation and that is harried by alert, aggressive competitors, an outfit that selects its leaders from among faceless, conforming men, each indistinguishable from the other—I am convinced that this personality—or lack of it—that has been ascribed to the Bell System has more than a little to do with the current laggard performance of our stock.

We must . . . we can . . . we will redress this image. But how?

By fixing service and improving earnings—that's the short answer.

But having said that, we are still left with the question: How? To elicit your help in answering that question is the principal reason why I am here. Let me simply suggest that the time to begin the search for that answer is *now* and the place to begin is *right here*—within our own business. For to my mind what most needs fixing in our business is what for lack of a better term I shall call "management motivation." Somehow we must find ways to banish the fretfulness that the current spate of "problems" has induced in all too many of our people. And somehow we must find ways to supplant that fretfulness with the "can-do" spirit that has characterized this business through nearly all its years. Somehow we must find a way to instill in *each* manager a sense of proprietorship toward his or her job.

Admittedly we have problems. I can't help but wonder, though, how serious those problems would look to Mr. Vail and his contemporaries, the men who fought the bare-knuckled competitive battles of our business' beginning years. And how serious would our problems look to the men who steered this business through the depression, who battled through the Walker investigation of the 1930's and the antitrust suit of the 1950's. Surely, measured against the problems the Bell System has met and mastered in the past, the problems we confront today don't loom so large. And isn't it these very problems that make life interesting, that add zest to the job of managing the country's biggest enterprise?

How then, can we dispel the uncertainties that seem to beset so many of our colleagues? How can we restore the purposefulness in our own ranks without which we can hardly expect the public to see us as a purposeful business? I know as well as you that the interlocking problems of management morale and public esteem won't yield to exhortation, to between-the-halves oratory. I have only two broad prescriptions.

My first is this: Speak out. Surely if we hope to convey to our own people and to the public that this is a business that believes in itself, we must be readier than we have traditionally been to stand up and be counted on issues that affect our business and its ability to serve. I am not urging that we seek contention for contention's sake. But I don't believe that we can complain that the public doesn't understand us so long as we let slurs against our business, whether they come from Nicholas von Hoffman or Nicholas Johnson, go unchallenged. Nor do I think we can complain about constraints on our business and its ability to serve unless and until, whenever policies are proposed that would impair our service to the public or add to its cost, we are ready to speak out for what we believe. We have been doing more of this in the last couple of years—to good effect, I think. Clearly we need to do more.

My second prescription is this: I think we must find ways to involve our management people more directly in the search for right answers to the issues confronting our business, the "problems" I've been talking about today. It is that search that makes my job interesting—and yours, too, I hope. We must learn to share it. Indeed, we need to share it. For all the wisdom that is concentrated at 195 Broadway, we simply cannot begin to specify right answers for every district and division in our business. At the same time district and division managers are not going to find right answers unless they know from me and from you the competing factors and considerations that have to be taken into account. In my view we can't do that with pieces of paper. We must talk with one another more. We have begun to do that on a System scale in our more frequent meetings with the presidents. As a consequence I think we know better where we want to go. If we can generate the same candor in communications *throughout* our companies, there is no problem we can't solve, no difficulty we can't surmount, nothing we can't do.

We had that experience at our Presidents' Conference in May. It was a different Presidents' Conference—because we wanted it to be different. We reduced to a bare minimum the number of formal presentations by the learned gentlemen from 195 Broadway and devoted most of our meeting to unstructured discussion of some of our business' most vexing problems. If I had any anxieties about the prospect of "dead air" at our meeting they were promptly laid to rest. The directness and candor with which the presidents spoke out on matters on which there *are* no non-controversial positions made our conference one of the most exciting and gratifying experiences of my life in the business.

Let me assure you now, as I assured the presidents, that we at AT&T would like to have the benefit of your experience with respect to the issues I've been describing. And, if you would care to share them, we need your views as to what the Bell System's position ought to be with respect to each.

The "message" I have been getting from Bell System management people all across the country is that, if AT&T's new management team hopes to provide the business a renewed sense of direction and purpose, some decisions are going to have to be made. Let me assure you we are going to make those decisions. Not all of them will be right in every particular. Some will change as conditions change. But we *are* going to decide—and we are going to articulate for you in language just as clear as we can make it the policies and directions those decisions dictate.

In conclusion, let me share with you the pledges I made on behalf of the Bell System's new management to our share owners in Denver, pledges I said at the beginning of this talk I would need your help to redeem.

Fundamentally, I said, our business exists for no other reason than the service it provides the public. Thus our responsibility to investors places no greater obligation upon us than doing the very best service job we know how to do. In short, we must earn our earnings and this your new management pledges itself to do. We pledge ourselves to earning our earnings by aggressively seeking out every opportunity for improved efficiency that new technology and new operating methods afford. And wherever marketing opportunities exist to enhance the profitability of this enterprise and the usefulness of its services to the public we pledge ourselves to exploiting those opportunities. And whenever and wherever these efforts fall short of achieving the level of earnings you have a right to expect from a growing, well-managed business, we pledge ourselves to the most vigorous representation of our needs to regulatory authorities that we know how to make.

We pledge ourselves to be good competitors in whatever realm of communications our efforts will contribute to better service at lower cost to the public and better earnings for share owners. And, finally, we pledge ourselves to speak out—to stand up and be counted—on issues that affect our business and its ability to serve.

It was against these pledges that I invited our share owners to measure the Bell System's performance. It is against these pledges that we intend to measure ourselves—the difference we do in fact make.

TELSTAR IS TEN

"The three television networks will provide extensive live coverage by satellite today of the funeral ceremonies and burial of Charles de Gaulle . . ."

This story appeared in the first edition of the *New York Times* of November 12, 1970—but on page 18, not a priority position to attract wide readership. That alone highlights the point that people today take the much-used words "live via satellite" so much for granted as almost to belittle the technological miracle of communications through space. Perhaps the world has been jaded by the coverage via satellite of the American moon landing in 1969, or perhaps people have just acclimated themselves more readily to the pace of technological change, coming to expect such achievements as commonplace.

The fact remains, though, that satellite communications is in its infancy. It began in earnest only 10 years ago at 4:35 A.M. on July 10, 1962, when a Thor-Delta rocket lifted off the launching pad at Cape Canaveral, Florida. Eleven minutes later, at 4:46 A.M., as the rocket's payload successfully achieved orbit, a new page was written in the history of communications.

The era of the communications satellite began with the launch of Telstar I, the world's first *active* satellite. A product of the engineering expertise of Bell Telephone Laboratories, Telstar was a child of the post-war technological revolution.

Roughly spherical in shape with 72 flat faces or facets, the satellite measured only 34½ inches in diameter, or about the size of a medicine ball, and weighed 170 pounds. The metal framework of Telstar was made of magnesium, the outer shell was built of aluminum coated with aluminum oxide.

It was powered by nickel-cadmium batteries that were recharged by the 3,600 solar cells located on the outer skin of the satellite. These cells converted sunlight into electricity. The satellite also contained 1,064 transistors, half of which were used for communications, the other half for command and telemetry. Another important piece of equipment in the satellite was the traveling wave tube, which provided the power output for the satellite. Basically, Telstar's mission was to receive a signal from the ground, amplify that signal *10 billion times* and retransmit it back to earth on another frequency.

Most of these pieces of innovative hardware grew out of research and development at Bell Labs.

Although the idea for communications satellites dates back to British scientist and writer Arthur C. Clarke, who proposed in 1945 that a manned satellite be used as a relay station for transmitting television signals between continents, the Bell System's interest in the theory began with Dr. John R. Pierce of Bell Labs. In 1954, Pierce made a formal proposal at Princeton University for a number of unmanned orbiting satellites which would serve as relay points for telephone and television signals.

Only five years later, scientists at Bell Labs in Holmdel, N.J., and at the Jet Propulsion Laboratory in Goldstone, Calif., successfully used the moon as a reflector for telephone conversations.

In August of 1960, the government launched Echo I, a giant, 10-story-high balloon, into space. Echo was a passive satellite that merely acted as a mirror, reflecting signals back to earth, much the same as the moon had done the year before. The rocket that put Echo into orbit was commanded and guided by a telemetry system designed by a Bell Labs-Western Electric team.

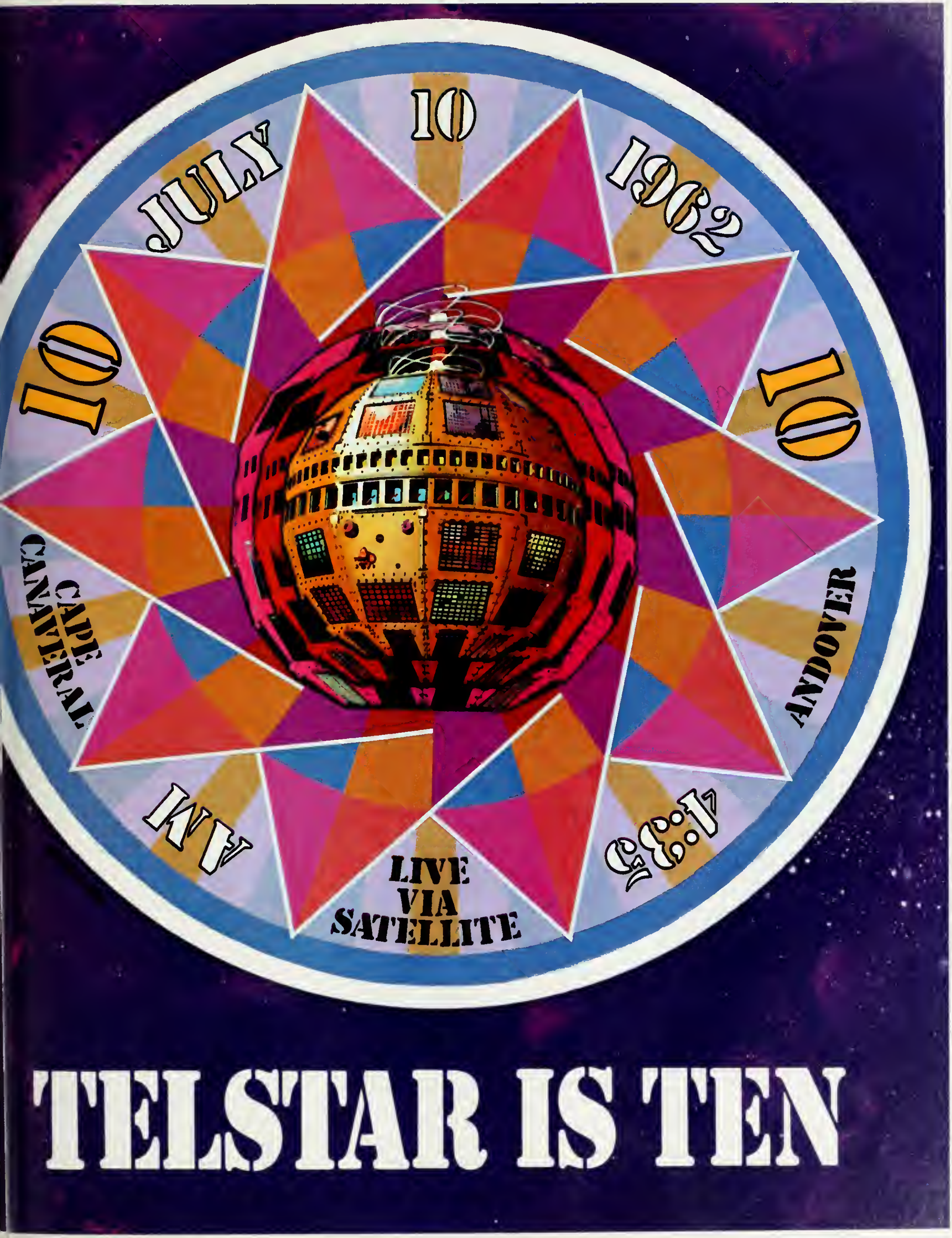
Dramatic though it was, the launch of Echo was no more than a practical first step in extending communications into space. The stage was set for a giant step—and the Telstar project was born. Before it was finished it would involve the efforts of more than 1,000 Bell people, more than 800 firms, most of them small manufacturers, and would extend over three years and cost $60 million.

But the project paid for itself in full that warm July day 10 years ago when former AT&T board chairman Frederick Kappel spoke via Telstar with then vice president Lyndon B. Johnson. Later in the evening, the first television signals were sent from earth to satellite back to earth successfully. During subsequent tests the French earth station at Pleumeur Bodou reported picking up the American signals from Telstar. International communications by satellite had begun.

Americans saw their first satellite telecast from Europe on July 11 when a seven-minute taped test program featuring noted French entertainers was broadcast at 7:35 A.M. The British sent the first live broadcast from Europe on Telstar's next orbit. By July 23rd, 16 countries of Europe were exchanging live television with the United States.

While Telstar itself got the lion's share of the publicity, an equally important part of the experiment never left the ground—the elaborate earth receiving station at Andover, Maine. The site was picked because of its relative isolation and because of its terrain, being surrounded by low hills, high enough to block out interfering radio signals but low enough not to block line of sight contact with the satellite.

A giant horn antenna of steel and aluminum, measuring 177 feet in length and 94 feet in height and weighing 380 tons was constructed specifically for the Telstar project.



TELSTAR IS TEN

Despite its bulk, the antenna and its associated equipment (horn, cab and framework) moved smoothly on its vertical axis in a full 360 degree circle. The horn antenna itself also moved on a horizontal axis from horizon to zenith. The whole structure was designed with the precision and tolerances associated with fine watches.

The antenna was housed inside a giant bubble or *radome*, an inflated structure made of Dacron and synthetic rubber about 1/16th of an inch thick but 210 feet in diameter and 160 feet high. It was here that the first live television signals were received from the satellite and relayed nationwide.

Telstar I was silenced on February 21, 1963, on its 226th day of flight. The cause was determined to be the effects of high level radiation. By this time, however, a second satellite, Telstar II, was ready to continue the experiments. It was launched on May 7, 1963 and quickly became a veteran reporter of news on both sides of the ocean. Carried live via Telstar II were such events as: Gordon Cooper's Mercury flight on May 16, the fatal illness of Pope John XXIII on May 31, the election of Pope Paul VI on June 21 and President Kennedy in Ireland on June 28.

Telstar II's timer automatically turned off the VHF telemetry transmitter on May 16, 1965 to prevent its signals from interfering with other uses of the frequency.

The impact of the first Telstar experiment was immediate and far reaching. In November, Congress passed the Communications Act of 1962, thus creating the Communications Satellite Corporation (Comsat). As a government-sponsored but privately owned company, Comsat was formally incorporated in February of 1963 when its ownership was vested in private stockholders and common carriers.

A little more than 2½ years after its formation, Comsat launched the first *commercial* communications satellite. On June 28, 1965 Early Bird went into orbit over the Atlantic Ocean. In ceremonies marking the event, President Lyndon Johnson spoke by telephone with world leaders in London, Paris, Bonn, Rome and Bern, Switzerland, and called the event, "a milestone in communications between nations."

Built by Hughes Aircraft Corporation for Comsat, Early Bird was tracked and commanded by the Bell System's ground station at Andover. Early Bird differed from Telstar in that its orbit was synchronous with the earth's rotation. Such a geostationary orbit permitted continuous communications. Early Bird orbited at 22,300 statute miles and moved at 7,000 miles per hour.

Comsat now represents the United States in the International Satellite Consortium (Intelsat), an organization that owns practically all the satellites in the worldwide space communications system (the Russian satellites are the exception). At the end of 1971, 82 countries were members of the consortium, and more than 50 earth stations in some 40 countries. To date, there have been 16 Intelsat launches; 10 satellites are operational.

Recently, public attention was focused on Intelsat IV, in service over the Pacific. This satellite provided the U.S. with television coverage of President Nixon's historic trip to China. Later this year, four more Intelsat IV's will be launched, providing total coverage for every area on the globe.

Yet, perhaps the most significant development in space communications as it enters its second decade is the growing recognition that space technology has more diverse potentialities than merely point-to-point communications.

Consider the proposed establishment of an aerosat system that would provide aircraft with reliable long-distance air-to-ground communications to replace or augment congested high frequency radio systems. The same system could also provide air surveillance over oceans comparable to ground-based radar. This would enable air traffic controllers to obtain a more precise reading on the position of every transoceanic aircraft.

Telstar worked in conjunction with the complex, elaborate earth stations at Andover, Pleumeur Bodou and Goonhilly Downs, Great Britain. Today, as a result of new technology in the form of high-gain spacecraft antennas and higher-powered satellite transmitters, relatively simple terminals can communicate via satellite. This trend will certainly continue in the next decade as the diameter of the spacecraft antenna becomes still larger and as satellite power output increases, easing the requirements for earth terminals. It is not hard to imagine a businessman on a fishing trip in Maine outfitted with an attache-case-sized piece of equipment, being able to communicate with anyone on earth who has access to a telephone. If one should doubt this, consider that in 1969 an Easterner who had never seen the Rocky Mountains sat in the comfort of his living room chair and casually viewed their lunar counterparts in the Sea of Tranquility.

That's not hard to believe because it is a fact. What is hard to believe is that only 10 years have passed since Telstar.

EDITORIAL

A Good Way to Run a Railroad

When Frederick R. Kappel retired six years ago, he told a reporter from a national magazine, "I am a private enterpriser from my hat to my socks." This inspired the interviewer to write that Mr. Kappel's successor, H. I. Romnes, "seems to be dressed the same way." The article continued, ". . . promotions are made within the pecking order, and Mother Bell rarely detours from the regular line of succession to fill an executive vacancy in the headquarters at 195 Broadway."

Such views were reiterated recently, when John deButts moved into the top Bell System job. To the outside observer it may appear that top Bell System officers are cut from the same cloth. From the inside vantage of this journal and its management readers, however, such judgments seem naive in the extreme. It is true that we do "grow our own" leaders in the Bell System, and always have. But their original disciplines—traffic, plant, commercial, engineering, manufacturing, R & D, and so forth, are as varied as the facets of a kaleidoscope.

The new chairman, for example, is a North Carolinian and an alumnus of Virginia Military Institute who joined the Chesapeake and Potomac Telephone Company of Virginia as a traffic trainee. His background includes a variety of posts with AT&T on different occasions, periods with C & P of Virginia, assignments with New York Telephone, the C & P Company in Washington, and also Illinois Bell, which he served as president. His predecessor, H. I. Romnes, was reared in rural Wisconsin, was graduated in engineering from the state university, joined Bell Laboratories in New York, worked for Illinois Bell, Long Lines, and served as president of Western Electric.

The career of Robert D. Lilley, AT&T's new president, is as distinctive. He was born in New York City, earned three degrees from Columbia, worked as an engineer in the coal industry, and "grew up" in the Western Electric Company in New Jersey, Baltimore and New York. He is a former president of New Jersey Bell. And the background of William L. Lindholm, the company's new vice chairman, is as individualistic in yet other ways. A native of Mountain Grove, Missouri, he was graduated from the state university with a degree in business and joined Southwestern Bell in Texas as a service representative. Lindholm spent most of his career in Texas and Missouri and served as president of the Chesapeake and Potomac Companies in Washington, D.C.

The diversity of backgrounds and "personalities" among the System's new top team is reflected in widely differing management styles. Obviously, all have proven their mettle in every area of corporate leadership over the years. Yet each of them has special strengths which complement those of his colleagues. Together, these strengths and differences form an impressive balance of ability for these times.

Bell System careers may in fact be more diverse than most non-Bell business careers in terms of areas of responsibilities top Bell managers have held. Most of them, too, have experienced responsibility for serving the public directly—an important criterion of leadership in this public-directed enterprise.

To those who impute inbreeding and insulation to this venerable business, we must point out that, unlike most companies, this one has almost a million men and women from whom to choose for promotion toward the top. And over the decades the System's tradition of training and promoting its own people into high leadership posts *has worked.* It has, at least, if one can believe such indices as technological innovation and continuous growth in construction, revenues, assets and employees under economic conditions of every kind over an impressively long period of years. The System currently trains some 340,000 people a year at a cost of $367 million. Such long-haul planning may be both alien and impossible in many other corporations, but it is the way this business builds its leaders, *because it feels it must.*

The "up from the ranks" rationale is simple. If a man grows up in a business, he gets to know it firsthand and others in it get to know him and what he can do. Add to that the Bell System's matchless resource of men and women from Western Electric, Bell Laboratories and 23 operating telephone companies—people performing every kind of communications job from coast to coast and from Canada to Mexico—and you have a talent pool unparalleled in the industrial world. Given such assets, would it not be irresponsible to ignore them and go out seeking strangers to fill top jobs?

This is not to say that the Bell System has never and will not ever staff top jobs from outside. The System will—and has—when a unique contribution is needed and the best person is an outsider.

Shock treatment executive turnover may have more flair and make for more interesting newspaper copy. *But does it make better companies?* The record would indicate not.

If Bell System leaders *are* similar in certain ways—like being homegrown, thorough in their knowledge of the business and sharing a fervent commitment to public service—it is by design. The special skills and experience they bring to their responsibilities are much needed in this singular business.

Such policy has served the System well. If there's a *better* way to run a railroad, or the world's best communications company, would that way kindly stand up and be recognized?

AT&T

American Telephone and Telegraph Company
195 Broadway, New York, N.Y. 10007

Moving? Please inform the *BTM* circulation coordinator in your Bell Company's Public Relations Department. **Please include the mailing label from this issue.**

Printed in U.S.A

Bell
TELEPHONE MAGAZINE

SEPTEMBER-OCTOBER 1972

KANSAS CITY, MO.
PUBLIC LIBRARY
OCT 11 1972

Bell
TELEPHONE MAGAZINE

VOLUME 51 NUMBER 5 SEPTEMBER/OCTOBER 1972

2 **Advertising: Who Needs It?**
By Paul M. Lund
How and why advertising is essential to the continued health and growth of the business.

8 **No Fighting! No Biting!**
By T. R. Weiss
Illinois Bell has made two seemingly diverse job enrichment programs compatible.

12 **Managing the Present to Insure the Future**
By Thomas J. Fay
An in-depth look at decision making, one of the most complex processes in modern business.

18 **AT&T at Basking Ridge: Accent on Ecology**
A photo display of AT&T's proposed office campus in suburban New Jersey.

20 **Three Weeks in June**
A report on the System's unique ability to respond quickly to the wide-spread storm damage of last June.

26 **Making the Most of the Machine**
By Donald R. Woodford
An examination of the ever-growing role of computers in managing the world's largest business.

John D. deButts
Chairman of the Board
Robert D. Lilley
President
William L. Lindholm
Vice Chairman
Frank A. Hutson, Jr.
Secretary
John J. Scanlon
Treasurer

Leonard Moran
Editor
Al Catalano
Art Director
Donald R. Woodford
Managing Editor
Thomas J. Fay
Associate Editor
William P. Kuhs
Associate Editor

Published by
American Telephone
and Telegraph Company
195 Broadway,
New York, N.Y. 10007
212 393-8255

"AS A BUSINESS CORPORATION ENGAGED IN SELLING AN IMPORTANT SERVICE, THE COMPANY IS ENTITLED TO TAKE ALL REASONABLE MEANS TO PROMOTE AND TO SEEK TO ENLARGE THAT BUSINESS. ONE OF THE MEANS USED BY ALMOST ALL BUSINESS CORPORATIONS IS ADVERTISING. THE COMPANY IS ENTITLED TO SPEND REASONABLE SUMS IN AN EFFORT TO RETAIN ITS CURRENT CUSTOMERS, TO ACQUIRE ADDITIONAL CUSTOMERS AND TO SELL TO ALL SUCH CUSTOMERS AS MANY OF ITS SERVICES AS IT HAS AVAILABLE FOR SALE. IT IS NO LESS ENTITLED TO ADVERTISE BY REASON OF THE FACT THAT IT IS A REGULATED PUBLIC UTILITY THAN IS THE ORDINARY BUSINESS CORPORATION."

SUPREME
JUDICIAL
COURT OF
MASSACHUSETTS

NOVEMBER 11, 1971

ADVERTISING: WHO NEEDS IT?

BY PAUL M. LUND

Is Ma Bell on an ego trip–or does advertising really pay off?

That's the upshot of questions that sometimes come to us from share owners, employees and customers. The answer is: Advertising pays off–for us and for the customer. Otherwise, we wouldn't bother to advertise when we're so obviously the only phone company in a great many situations. And we wouldn't put ourselves in the peculiar position of asking regulatory agencies to okay higher rates on the one hand and go on spending precious dollars for advertising on the other.

Where's the payoff? The old cliché goes that you have to spend money to make money. And, of course, we need to make money. But we also spend money to *save* money. And by stimulating revenues and saving expense for ourselves through advertising, we're able to give the customer–aside from top quality service–lower telephone rates than he or she would have if we didn't advertise.

And, of course, like most businesses, we advertise to meet competition. We do have very real competition, particularly in the business communications field. And we do compete with all businesses for investors' dollars as well as for good employees.

These reasons for advertising work hand-in-glove with still a fourth reason, one that stems from a credo that stretches back toward the beginning of this century, when AT&T became the first American company to conduct a corporate advertising program. That credo: The Bell System can operate more efficiently when people understand what we are doing and why. Misunderstanding is very costly to us in employee time, delays and unrealized opportunities.

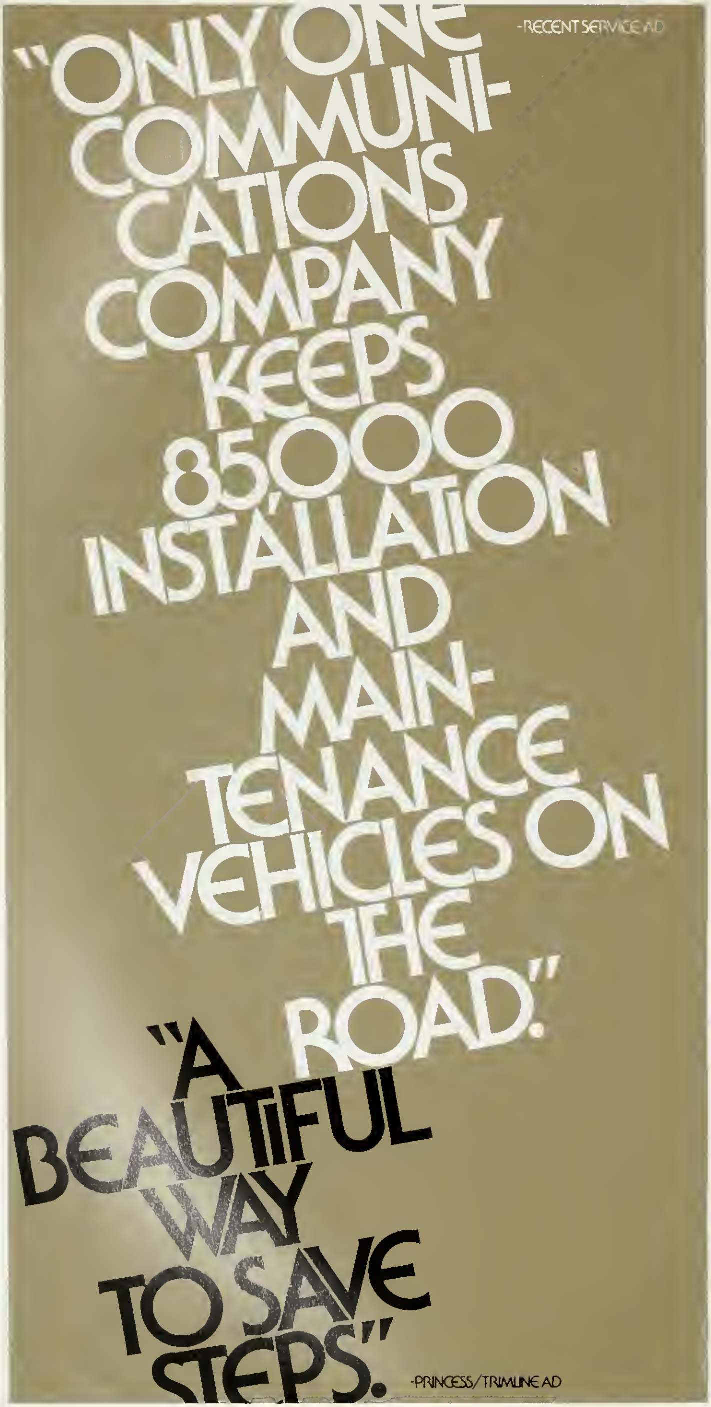
Our first ad on record, published in June, 1908, declared that "a perfect understanding by the public of the management and full scope of the Bell Telephone System can have but one effect, and that, a most desirable one–a marked betterment of service."

Thus, we advertise not only to make and save money, and to compete, but also to compete for the public understanding which makes optimum service possible.

Advertising in the mass media reaches great numbers of people. And it's economical. We'll spend about $80 million across the Bell System to advertise in 1972. That's about 6/10 of one per cent of our total revenue (which, by the way, is a far smaller share than most other large companies' advertising expenditures). To illustrate the mathematical bargain–our television series, *The Bell System Family Theatre*, costs an average of $4.28 to reach 1,000 adults with 6 to 8 minutes of commercial messages. A postcard to 1,000 people would cost $60 in postage alone. And then there is the qualitative bargain–we'd never be able to put on a postcard the helpful content nor the impact our messages are able to deliver through the medium of television.

How does advertising help increase revenues? By promoting greater use of our services in competition for discretionary consumer dollars. For example, nearly $20 million is spent annually by the Bell System on advertising to promote long distance calling. Since 1954, when this advertising was begun on a national basis, long distance calling has grown by an astounding 323 per cent. During the same period, the U.S. population grew by 24 per cent, the number of customers by 65 per cent, gross national product and disposable personal income by 79 per cent. Advertising can't accept all the applause for long distance growth, but research has shown that it certainly has played a vital role.

Advertising helps reduce our expenses–and thereby, the cost to customers–by instructing people on how best to use our services. We advertise to promote direct-dial long distance calls and to help channel calls away from heavy peak calling periods. By changing their calling habits (that is, by dialing direct and by calling after 5 P.M. weekdays and all day on weekends), customers save themselves money and we in turn make more efficient use of our busy nationwide network. (Telling a customer how to *save* money is something most advertising can't, as a rule, claim!) It's in this area of reducing expenses that advertising can take a great deal of credit–to the tune of more than $36 million


"ONLY ONE COMMUNICATIONS COMPANY KEEPS 85000 INSTALLATION AND MAINTENANCE VEHICLES ON THE ROAD."

-RECENT SERVICE AD

"A BEAUTIFUL WAY TO SAVE STEPS."

-PRINCESS/TRIMLINE AD

in annual savings from direct-dialed interstate calls alone, as an example.

Direct-dial calls are estimated to have increased from 60.7 per cent of total volume in 1970 to nearly 67 per cent in 1971. The percentage points mean huge savings for us because each point up means a similar point reduction in operator-assisted toll calls. And each of these point reductions results in a $6 million net savings in operator costs alone. Over and above it are the savings in capital construction that would be needed to accommodate operators and equipment if the trend were going the other way.

A special dial direct campaign began in January 1971 after a new rate schedule went into effect. An ad in about 200 newspapers in the top 100 markets announced, "Dial it yourself and save," and told of the cost difference between a call placed by an operator and a call dialed directly by the customer. The ad pointed out that on a New York-Los Angeles call, the cost is $1. operator-aided and 70 cents without the operator. Since then, TV commercials also have plugged the dial-it-yourself theme. This two-year campaign, which so far has saved the Bell System some $60 million in total, has cost us all of $8 million.

These savings, of course, mean savings to our customers, the consumers and users of our services.

Advertising helps us compete, too. That's one reason why we're concerned about image.

But aren't we, after all, Number One? Haven't we cornered the communications market?

It is true that Bell companies are exclusively franchised to provide *basic telephone service* in their respective operating areas. But we have very direct competition—in services for the businessman, for example—from a growing number of communications companies. These companies are advertising and selling—aggressively in an effort to attract new business customers for communications service, and to lure present Bell customers away.

And we must compete, too, with *all* industry for investor dollars

d for the *employees* essential to
oviding that quality service we
ize so highly. Meeting these and
her kinds of competition requires
at we keep *all of our publics* very
ell informed of our services, our
eeds and our policies. Advertising
by far the cheapest way to do it.

Our health as an enterprise de-
ends on public support. Without it,
aising revenues and meeting com-
etition are unattainable goals. Pro-
iding topnotch service is the key-
one of such support. Advertising
a reinforcing tool that helps build
nd maintain it.

How do we go about communi-
ating with the public? By selecting
e best medium for the story we
ant to tell. Television, for ex-
mple, provides an immediate mass
udience.

We buy TV spots—individual 30-
econd slots—in prime and daytime
rogramming to encourage use of
ellow Pages for advertising and we
uy time in televised sports events
nd news programs to sell the busi-
essman equipment and services
vailable to him through the Bell
ystem.

But our major endeavor is tele-
ision programming aimed at the
ass audience. Our present series—
he Bell System Family Theatre—
as born in 1970. It's geared to the
merican family audience: a series
f uniquely different programs tied
ogether by a format dedicated only
o quality; flexible enough to adapt
o shifting public tastes, and flexible
nough, too, to attract smaller audi-
nces to an occasional specialized
heme. The series has achieved ex-
ellent ratings, reaching 91 million
omes last season, and at the same
ime winning six Emmys for artistic
xcellence.

There's another side of advertising, one aimed not at the mass audience but solely at business. This is a side that's becoming more and more relevant now that the Bell System finds itself in an era of direct, head-to-head competition with other suppliers. We've structured a sales approach and technique which will help us thrive in a competitive climate. Ads in business magazines like *Fortune*, *Forbes* and *Business Week* (as well as the spot commercials on televised sports and news shows) pinpoint our capabilities to

-CURRENT LONG DISTANCE AD

"WE
HAVE TWO
REASONS
FOR URGING
YOU TO
DIAL YOUR
LONG
DISTANCE
CALLS DIRECT
YOU SAVE.
AND
WE SAVE,
TOO."

"911
IS SO NICE
TO HAVE
AROUND
THE
HOUSE."

-RECENT SERVICE AD

provide the business world not only with ordinary telephone service but also with unique communications equipment and services, and at-the-ready skilled maintenance. Our aim is to show that far from abdicating any sector of our business, we can do a far better job than anyone else.

In addition to across-the-board business advertising there is advertising aimed at some 20 special markets.* Exhibits are placed at conventions and other meetings, tailored to illustrate to specific markets the benefits of Bell System service, equipment and our nationwide network.

Staffing the exhibits are Bell communications consultants. As many as 35 of these exhibits can be on display simultaneously—with as many as 10 in one market—at different shows around the country. Other aspects of market-oriented advertising are ads and product publicity stories in trade publications, promotional brochures and direct mail campaigns.

Bell System advertising has two forms: national and local. AT&T general headquarters advertises in national media on behalf of the total Bell System in campaigns that embrace objectives, themes and subjects universally applicable to System operations. AT&T also advertises nationally to promote Yellow Pages. Long Lines advertises nationally to promote long distance usage. Western Electric advertises nationally and in cities where its plants are located, largely to identify and explain its role in the Bell System and to recruit employees. Bell Laboratories has advertised in scientific and engineering publications for educational purposes, and also to help recruit scientists and engineers. Long Lines, Western Electric and Bell Labs cooperate with AT&T in providing commercial subjects for TV programming.

Local telephone companies advertise within their own operating territory. Their campaigns support and complement national efforts. But primarily, their purpose is to provide individually tailored, competitive, residence telephone sales and service aid* advertising support required locally and regionally.

Advertising is a creative field, an art rather than a science. But it can be planned somewhat scientifically. In the Bell System, long-term as well as near-term needs of the business are reviewed and analyzed to see how and where advertising support may be required. This year, for instance, we're giving particular attention to our dedication to good service (and the little understood interdependence of good service and fair telephone rates), Bell people and our innovative qualities. In our business sales advertising, we're stressing our flexibility and long experience as well as our maintenance capabilities.

A potential campaign's specific objectives and communications goals dictate the intensity of the advertising effort and suggest the media to be used. Then a budget for each campaign can be established, based on estimated media cost, plus an amount for production expenses. This done, all possible campaigns are brought together as a program. The program is reviewed in light of needs and resources of the business and of economic conditions. Sometimes, the business environment will be such that one or more of the proposed campaigns will be abandoned, deferred or modified.

For instance, late last year, economic conditions indicated that we should add a new dimension to our service story and concentrate on telling the public just how much providing quality telephone service costs the Bell System. We had TV commercials and print ads that

---

*Banking, business management, medical, savings and loan, education, federal government, architects and builders, construction, data, insurance, right-of-way/pipeline/railroads, investment, local and state government, trucking, food, hotel/motel, retailing, services for the handicapped, telephone answering services.

*Service aid advertising is designed to help the customer get the greatest benefit from his telephone service: promotion of directory use instead of calls to directory assistance, Direct Distance Dialing cost advantages, emergency reporting systems, the universal emergency number (911) where applicable, and how to avoid being billed for long distance calls dialed in error. For the most part, this kind of help is available in the telephone book, but many customers may not know it is there. At a time when service features are changing, we feel it's essential to use advertising to make the public aware of how to get maximum benefit from telephone service.

RECENT SERVICE AD SHOWING BELL SYSTEM EXPENSE

made a direct connection between rising costs throughout the economy and their effect on us, and their potential effect on customer service. We attempted to show that while we understand that the consumer was being hit in the pocketbook from both sides, residential telephone rates nationally had increased only one-fourth as much as the average of all prices. We also pointed out the essentiality of modestly higher telephone prices to the continued provision of first quality telephone service.

Advertising budgets are authorized a year at a time and adjusted as conditions change. Ad campaigns are undertaken to meet specific needs and accomplish specific objectives and money is allocated to get the best results. The costs are balanced against anticipated benefits—savings, increased revenues, improved understanding —to the customer as well as to the business. But there is no magic policy that can precisely determine the level of advertising spending.

How do we know what kind of job we're doing? There are syndicated research services that provide measurements. We submit print ads and TV commercials for this kind of microscopic examination. Indeed, we even have post-studies run on our *Bell System Family Theatre* presentations to see if people are watching us and what they think of our offerings; it's an ongoing monitoring system to keep us abreast of fluctuations in public tastes and attitudes. As for our advertising messages, they are measured on the basis of the public's awareness of them. Did they see our ad or commercial, what do they remember about it, did they understand it, did they like it, did they accept it, did they believe it?

We win some, we lose some. Interestingly, to take TV commercials as an example, those commercials that are the "softest-sell" and that stress the human element are the most successful in communicating with polled audiences. These would include the long distance "emotional" messages ("Remember when you had heart-to-heart talks with your father—you still can . . ."), the commercial on the volunteer work of the Telephone Pioneers of America and the humorous look at installer training ("When it comes to installer training, practice makes perfect.").

But overall, we're winning. According to the Opinion Research Corporation, "The best known industries are those to which the public is constantly exposed through advertising, product use or everyday experiences. People are generally most favorable to the industries they know best." AT&T is most favorably regarded, says ORC, among those segments of the population that know the company best. "This suggests that maintaining familiarity with AT&T at a high level will help in maintaining or improving the company's overall public reputation."

When this century and our business were young, it seemed logical for us to have a standard of service we expected to live up to. And it seemed just as logical and necessary to rely on advertising to let the public know how we felt. Considering the "public be damned" attitude of some businesses of that period, our commitment to maintain a high standard of service was downright revolutionary. So was the so-called Dallas Declaration of Walter S. Gifford, then AT&T president, in 1927: "The best possible telephone service at the lowest cost consistent with financial safety" forswore undue profits and implied that engineering advances were to go to the public in the form of better service and lower costs.

Today, while we're sticking to fundamental objectives, we're changing some of the ways in which we do business because society is demanding change in many sectors of everyday life, and we ourselves acknowledge the need for change. Advertising is one of those fundamentals we're sticking to. Though advertising styles keep changing along with everything else, it's as important as ever to rely on advertising as a business tool to make money, to save money, to compete, and to build and maintain public attitudes which enhance our ability to serve. And, in turn, to provide ample cost/value benefit to a very important individual—the customer.

Mr. Lund is vice president-public relations at AT&T.

NO FIGHTING! NO BITING!

Job enrichment and Organizational Development, two management philosophies often at odds, are considered complementary in Illinois.

BY T. R. WEISS

The degree of confusion that exists today in management circles about the relationship between Organizational Development and Job Enrichment (or Work Itself, as it's called in the Bell System) has few parallels in business history.

Unfortunately for the proponents of both concepts, this confusion has led to a considerable amount of mistrust, cynicism and even apathy about the relative value of Organizational Development (OD) and Job Enrichment methods. The wasteful internecine rivalry that has arisen between these two major, contemporary management philosophies has seriously damaged the effectiveness of these processes in bringing about planned change.

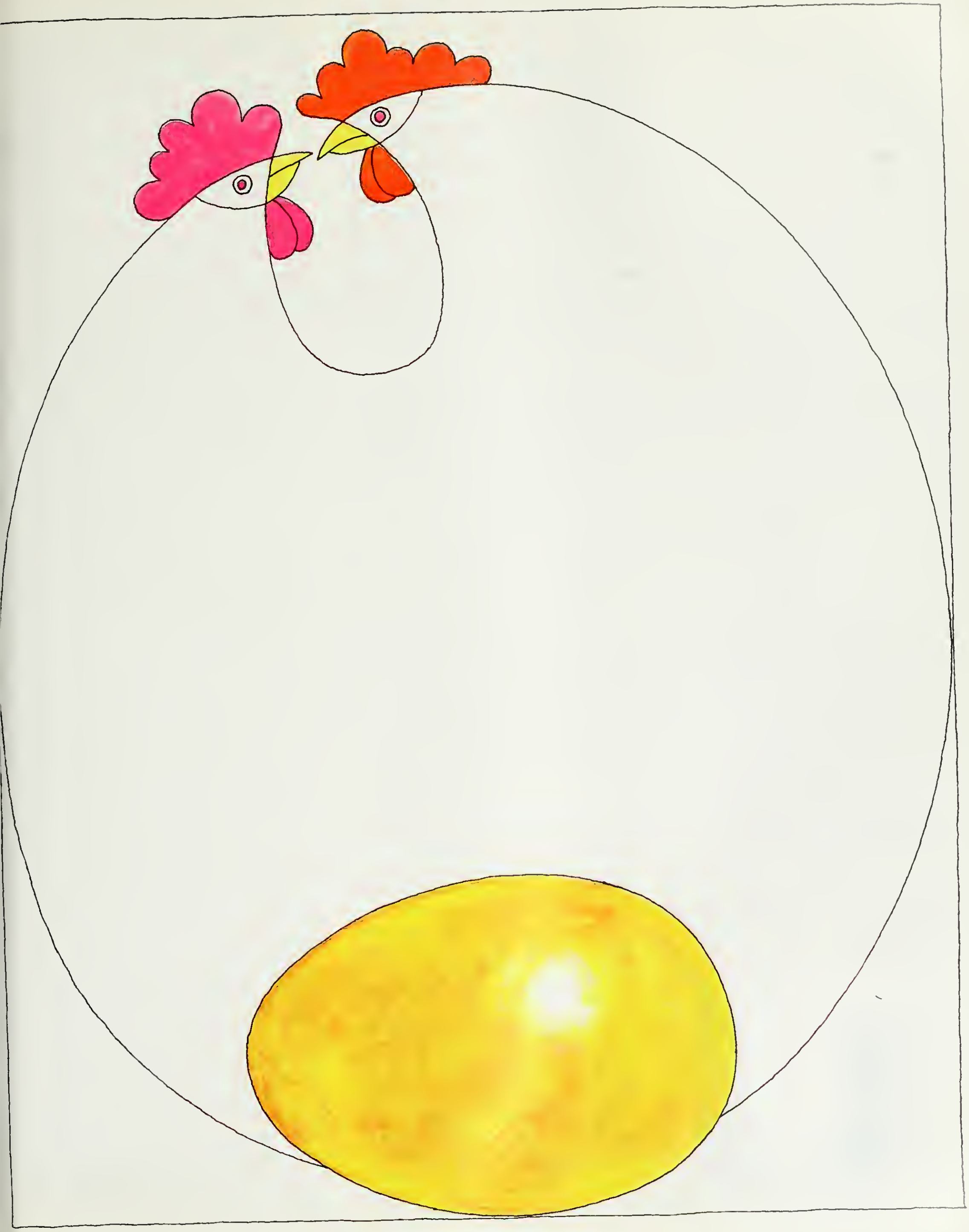
What is at the core of this general confusion about OD and Job Enrichment? And what, if anything, can be done to clarify the issue and allow both to be the useful management tools they were intended to be? To gain adequate perspective on the problem, it may be helpful to review briefly the purposes and methodologies of Job Enrichment and OD, and examine the differences and similarities in these processes. In the broadest sense, both processes are aimed at improving individual job satisfaction and overall organizational performance. There are, however, clear differences in the methodologies used to achieve these goals.

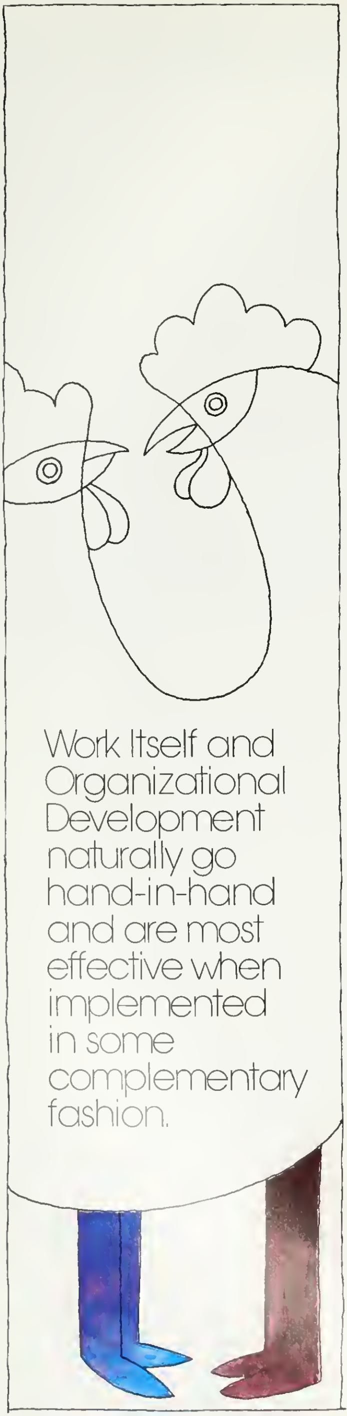
Work Itself—I prefer to use the less generic term in this case—is based largely on the job enrichment principles of Frederick Herzberg. These principles contend that motivation, productivity and overall human performance are directly related to the degree of satisfaction a person achieves in his or her job. Through a technique called "greenlighting," Work Itself uses the ideas people have about how to enrich jobs to begin to change those jobs, in whatever ways that seem appropriate, and thereby help individuals receive greater personal satisfaction from the tasks performed.

While Work Itself concentrates on the *job* as the key factor in accomplishing change, Organizational Development focuses on the *organization*. It is basically a problem-solving management tool that utilizes commonly accepted behavioral science concepts and techniques in conjunction with basic management principles related to decision making, control, communications and goal setting. In doing so, OD examines the processes in the organization—*how* things get done, rather than *what* things get done.

One effective analogy for illustrating how these two methods function when in use is in the area of anatomical medicine. Work Itself concludes that good (organizational) health can best be maintained by keeping the primary organ—the heart, most likely, or brain, if you prefer—in good working order. The theory is that if the primary organ (the job) is healthy, this health will be transmitted naturally to the other organs of the body and sickness, therefore, will be avoided.

OD, on the other hand, begins with the premise that a physical check-up is the first order of business, to determine which, if any, of the bodily organs are diseased or in need of treatment. The check-up tells us whether, in fact, it is the heart (the job) that needs attention, or if the malignancy is located elsewhere—perhaps in the "liver" or "spleen." Once the trouble spot is identified, the appropriate medicine can be prescribed and the patient (the organization) is put on the road to recovery. And, in many cases, the appropriate medicine may well be Work Itself, but not





Work Itself and Organizational Development naturally go hand-in-hand and are most effective when implemented in some complementary fashion.

always. In short, Work Itself is a specific treatment for a specific ailment. OD is a check-up to measure the organization's general health, with appropriate medicine or treatment prescribed accordingly.

Many management people who espouse one of these approaches over the other have been so zealous in lauding the merits of either Work Itself or OD that they have been unable or unwilling to see the complementary nature of the two processes. Personal commitment to an ideal is an admirable trait, but it often clouds an individual's ability to view a situation objectively. The result can be as damaging to one's own cause as to another's.

I have heard OD enthusiasts denigrate Work Itself with such terms as "obsolete," "short-sighted," "overly structured" and "simplistic." Their Work Itself counterparts, on the other hand, view Organizational Development with much suspicion and disdain, calling it "too fuzzy-headed and abstract," "impossible to measure," "unrealistic" and sometimes, less charitably, "an outright hoax."

Such passionate denouncements further neither cause. If anything, such charges tend to strengthen managerial resistance to both processes. And, that way, no one wins and everyone loses. At Illinois Bell, we view Work Itself and OD as semi-autonomous, yet interdependent management tools. There is no vying for preeminence, no competing for clients. We have discovered an all-too-simple yet surprisingly little-acknowledged fact. Work Itself and Organization Development naturally go hand-in-hand, and are most effective when implemented in some complementary fashion.

In one OD project, our diagnosis revealed that a successful Work Itself effort in one district was being jeopardized because of deep-seated problems related to the traditional managerial processes in the organization. Work Itself was inadvertently being undermined because of the quality of certain decisions being made in the hierarchy and the manner and degree of the delegation process in the organization. The application of OD techniques accomplished what Work Itself is not really designed to do. It helped these interpersonal issues to surface and be dealt with directly.

In another OD project, our diagnosis of the organization revealed that some job-related issues were among the key concerns of the people in that organization. Through a series of informal interventions, the principles of Work Itself were used to enrich the job of the telephone equipment tester and others.

There are similarities in the data-gathering approaches used by Work Itself and Organizational Development. "Greenlighting," the free-wheeling, brainstorming technique that is integral to the Work Itself process, is a way of diagnosing the job in terms of identifying key concerns of management. OD diagnoses the organization by using questionnaires, interviews, observation of group processes and the like, to identify key management concerns. Generally, greenlighting sets aside issues "unrelated" to the job function itself, while OD diagnosis considers all issues valid to the objectives of the process. In that sense, OD strengthens Work Itself, because it requires that job deficiencies be viewed in the context of the entire organization, rather than as an isolated problem.

In a training film titled, "*Making Human Resources Productive*," M. Scott Myers, a leading industrial psychologist with Texas Instruments, Inc., contends that many job enrichment efforts fail because not enough attention is given to organizational climate. Myers feels that this climate involves much more than the relationship of an individual to his job. More accurately, it's the relationship of the individual to the entire organization and to the sub-divisions of which he is a part.

Myers' view of job enrichment, then, goes considerably beyond merely that of the functional details of the job or building more responsibility into individual jobs. He feels that true job enrichment (and OD, for that matter) involves "nothing less than altering the relationship of the individual employee to the authority structure of the organization." As Myers puts it, "it affects every aspect of work climate and work relationship, from parking lot restrictions to pay and promotion policies affecting every employee."

Even in organizational units that have bestowed the appropriate high-level blessing on Work Itself and made a sincere attempt to implement it successfully, the success has been frustratingly elusive. What often happens is that many managers—in an effort to put Work Itself principles into practice—run head-on into their own traditional biases and authoritarian concepts, and the resulting conflict all but guarantees failure if it is not dealt with openly.

The continuing debate about which ought to come *first*—Work Itself or Organizational Development—is akin to the tiresome argument about the chicken and the egg. It really makes little difference which comes first, between OD and Work Itself, as long as the objectives are clear, the approach fits the needs of the situation, and the results can be achieved. Either process can be used as the springboard to a developmental effort designed to bring about planned change.

The discussion about which is the best vehicle for achieving planned change, or proactive (rather than reactive) management, is not by any means limited to Work Itself and Organizational Development. Growing numbers of management specialists are beginning to view Management by Objectives as the most practical way to get into the OD process. Whether it is or it isn't is a moot point. The fact of the matter is that any of these approaches, as well as others heretofore unmentioned, are relatively appropriate, depending on the circumstances. Many reputable management tools aimed at improving the organization can be used as a suitable entry vehicle for OD, if a full-scale OD approach is deemed inappropriate as a starter. As long as these approaches are used in conjunction with each other, rather than separately, the goals of planned change remain attainable.

Another area in which we see OD augmenting Work Itself is in the all-important "follow-up" phase. The real value of any of these processes lies in their ability to sustain themselves without continued bolstering from forces outside the organization. A large majority of Work Itself failures can be traced to its lack of staying power when no special provision has been made for reinforcement. If the norms of the organization are not changed right along with the job, it is unrealistic to expect new job behaviors to become permanent.

Since one of OD's common goals is to facilitate a long-term, *continuous* process, it can help to stabilize new organizational behaviors and create a self-reinforcing mechanism through various behavioral science techniques that are part of the whole process. As one might expect, this requires considerable patience and endurance. Individuals change their norms reluctantly; organizations even more so. But it can and does happen, and the payoff is lasting success.

You may feel at this point much like the scholars who, after hearing an explanation of Einstein's theory of relativity, said, "We are still confused, but now on a much higher level." If so, a summary may help.

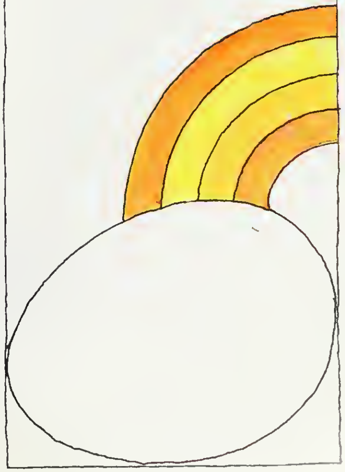
OD and Work Itself are two important management tools with similar goals and different methods of attaining them. Work Itself concentrates on improving individual job satisfaction and group performance by enriching the functions performed by the individual. OD begins with a diagnosis of the whole organization and applies therapeutic help to the ailing part of the organization. Generally, OD is concerned with how an organization functions; Work Itself is concerned with how the jobs within the organization are structured.

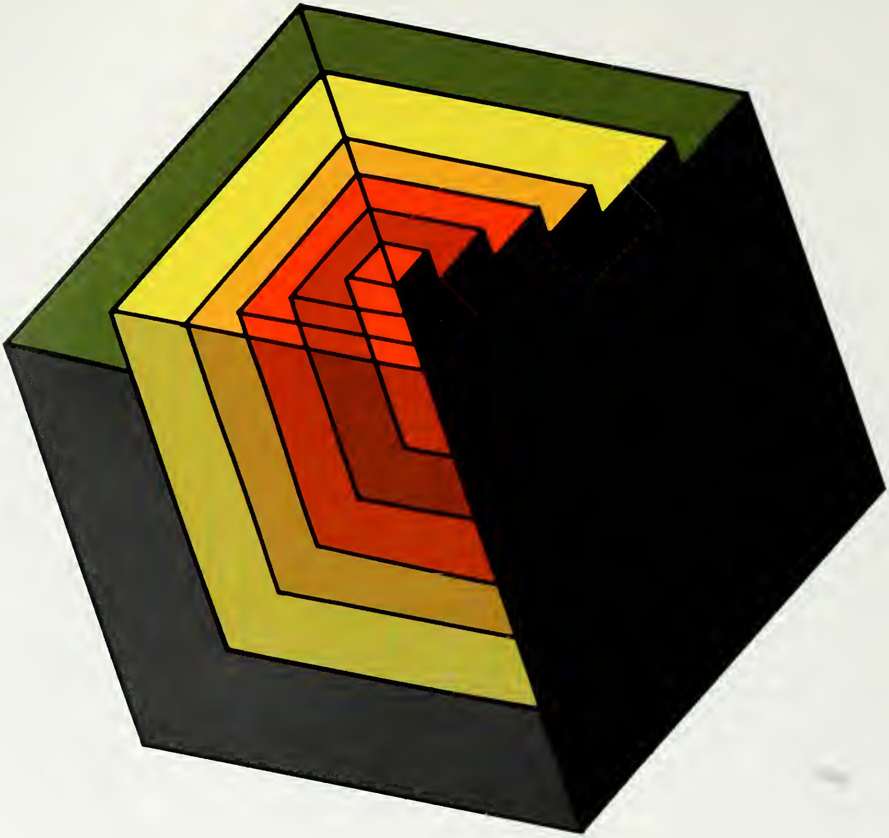
Either process can be a suitable way to begin to help an organization to solve its problems. But they should work together in an interdependent manner if planned change is to be realized.

At Illinois Bell, we are convinced the working partnership between OD and Work Itself offers the best promise for maintaining the kind of viable organization that can simultaneously achieve lasting individual job satisfaction and overall corporate objectives. In a world of rapidly accelerating change, such viability could make the difference between survival and extinction.

Mr. Weiss is personnel supervisor-organization development for Illinois Bell. He joined Illinois Bell's public relations department in 1967 and moved to his present job in 1970.

The continuing debate about which ought to come first, Work Itself or OD, is akin to the tiresome argument about the chicken and the egg.





The Decision-Making Process:

Managing the Present to Insure the Future

The world of *if* is an imaginary realm, a twilight zone of *what might have been* had only an opposite decision been reached at a specific point in time. That world is filled with happy marriages, with dazzling business moves, with stock market successes and all the stuff of which daydreams are made.

But the world of *if* is a presuming one: it invariably supposes that an entirely different course of action than the one taken would indeed have produced the desired result.

In the real world, a decision reached by an individual or by a corporation can have limited or far-reaching consequences, depending, of course, on the nature of the decision itself. A wrong choice of options can thus have dire results for the individual and his family or for the corporation and its associated businesses. In the Bell System, a decision reached at the highest levels of management today affects more than one million employees, three million share owners and the public at large. It is little wonder then that more time, more resources and more energy are spent in today's business world than ever before over a function described by Noah Webster simply as the act of deciding or choosing.

But making a sound decision is much more than a simple act by an individual or a corporate executive board. Decision making has evolved into a process as complex as the computers that serve it. And literally hundreds of books have flooded the market in the past decade advising the unwary reader how to make everything from a rational decision based on hard data to a snap judgment based on intuition.

As with much literature dealing with theory, books on decision making often do little more than set up ideal frameworks to search for ideal answers to ideal questions. Unfortunately, such is not the case in today's world of hard practicality.

In the past, many excellent decision makers made up their minds by intuition. They had learned through experience, repetition, failures and successes how to make decisions and have them right more often than they were wrong. There was nothing against this type of decision making in simpler times—times relatively unbothered by economic, social, political or ecological woes. But today it is only a rash or foolish man who will trust his future and the future of his company to such a tenuous, intuitive thread.

Yet, there is a great clamoring today among the ranks of lower and middle management in the Bell System for quick answers to the problems facing the business, complicated problems such as the uncertainties of competition. But the day of the simple answer is gone. It left when the pace of change accelerated beyond all expectation. To try and pinpoint the time when this became apparent for Bell System management is difficult. Perhaps the post-World War II boom in service demand followed immediately by the revolution in electronics, particularly the invention of the transistor, can be called a turning point. Until then, with the exception of Theodore N. Vail's sweeping policy statements, most decisions could be made by adaptation.

In any event, the world that the telephone business grew up in changed, mutated into a business climate where permutations, nuances and ramifications have to be carefully studied before a definitive decision can be made.

Choice amid uncertainty

Crisp, clear answers to problems can not flow as quickly as they did in the entrepreneurial time of Theodore N. Vail. Nor should they. The process for sound decision making to be outlined here is the result of years of study. It is designed to serve the System as the pace of change increases.

What has evolved is a methodology designed to make use of the tools now available to the decision maker, tools such as mathematical modeling and operations research.

Concisely defined, decision making is the act of choosing under conditions of uncertainty. Henry M. Boettinger, director of planning at AT&T, describes the act of decision as, "a clear and complete cut between the present and the future. Through a careful study of trends, the future momentum of a given enterprise can be predicted with some degree of accuracy. But a decision made at a specific point along the way creates new trends and a new future not as predictable as one based on continued momentum."

In the Bell System, management is faced with two distinct types of decisions: those made in the everyday operation of the company and those that affect policy. By way of analogy, the difference between the two is similar to the difference between tactics and strategy.

The tactical type of decision is made against a background of existing rules and practices, while the strategic decision changes those rules and practices.

For example, Vail's now famous policy statement that the goal of the fledgling American Telephone & Telegraph Company should be universal telephone service was the most fundamental policy decision in the company's history. Having been made by the company's top executive officer, it was obviously a strategic decision. How that goal was to be accomplished was another matter, left to the operational skill and tactical decisions of Vail's subordinates. Although the tactical decision ranks lower in the hierarchical structure of decision making, this in no way minimizes its importance to the success of the business.

The operational decision, tactical in nature, is made on a daily basis by just about everyone in the Bell System, from service representative to operating vice president, from installer to plant executive, from communications consultant to marketing vice president. Yet, it is the result of following orderly processes. First, an operational decision is based on a form of legalistic reasoning, its precedents are in the past and it tries a present case against the rules of existing policy to arrive at its conclusion. What was correct last week can still be correct today, for example. This type of decision is analogical in its implementation and is made with existing corporate policies in mind.

Complex but flexible

Yet for all its seeming stringency, an operational decision must remain flexible, although becoming extremely complex and intellectually demanding. Take for example, a hypothetical case of a local volunteer rescue squad in a small town not paying its monthly bill. Policy dictates that after a prudent length of time for nonpayment, service should be suspended. Obviously, a local manager should not automatically suspend service to so vital a volunteer agency. Equally obvious is the fact that some arrangement would have to be worked out to the satisfaction of both parties. Perhaps extenuating circumstances caused the non-payment. Perhaps municipal funds had been cut, delaying the payment. The fact is that the operational decision in such a case would have to interpret the overall policy of collection practice to fit the local condition.

The policy decision, strategic in nature, is based solely on management reasoning; it has no precedents to fall back on. It is made with an eye to the future, and, since it changes or amends existing policy, it directly influences many operational decisions from the time it is made. Basically, a policy is a list or system of principles by which we can answer the question of what to do in this or that set of circumstances. It requires a general and broad understanding of the type of situation to be met, but is always formed with *purpose* in mind.

Decision-making agencies

A change in policy in the Bell System is a massive undertaking. Thousands of persons must be retrained, entire systems altered. A policy change in pricing, for example, may necessitate a retraining of toll operators, alteration in accounting systems, new methods of customer contact and the like.

To see how this process works, an examination of the decision-making structure now in use at AT&T can serve as a model of modern corporate thinking. While this example will, by necessity, be restricted to the rationale behind a policy decision, it is by no means restricted to that function. Organizations similar to the ones described here are present to a lesser degree in all the associated companies and serve virtually the same purpose. Therein lies this process' greatest value—adaptability.

The agencies for decision making at AT&T dealing with policy are the Board of Directors, the Executive Policy Committee (EPC), the Presidents' Conferences, the Corporate

Planning Organization and the staff groups of the individual company officers. A closer look at each may be useful.

In the United States, more than 75 per cent of the state laws under which corporations are established require that the corporation be managed by a board of directors. The number of persons comprising the board, however, varies, the minimum being set at three.

The origin of this corporate form dates well back into antiquity. The ancient Code of Hammurabi in 2083 B.C. gave Babylonians a type of lasting partnership through which business could be carried on for years. The Romans also used a corporate form, the *Societates*, considered as an individual person in place of others with a board of directors required at its formation.

Origin of modern board

The modern board of directors owes its ancestry to boards of proprietors of the early British joint stock companies. This form provided for a joint ownership of a business by a number of persons, each with limited individual liability. As the number of joint owners grew, the opportunity for major holders or insiders to manipulate funds likewise increased. Principles of common law dictated that a board be established to stand in the place of the joint owners. This practice became widespread in England and was carried over into the statutes governing corporations in the United States.

Thus, from both an historical and practical point of view, whenever power or funds have been entrusted by many to a few individuals, it is customary to appoint a board of directors to assure that the resources are well used and that the company is well managed. It is also logical that the board itself *not* manage the day-to-day operation of the company, but rather *see to it* that the company is well managed.

Such is the case in the Bell System. The AT&T Board of Directors is composed of 19 individuals, all of whom have the art and science of management as their field of expertise. Their role in the decision-making process is important because major decisions suggested by other agencies of the decision process are authorized and approved at this level.

The Executive Policy Committee is the Bell System's highest decision-making body, and consists of John D. deButts, chairman of the board; Robert D. Lilley, president; William L. Lindholm, vice chairman; Cornelius W. Owens, executive vice president and Horace P. Moulton, vice president and general counsel. Alvin von Auw, vice president and assistant to the chairman, serves as secretary to the EPC. Its members come to meetings not as representatives of the departments they head, but as general corporate officers, jointly responsible for the entire spectrum of the business' concerns.

The Committee itself is a response to change and complexity—a recognition of the fact that the issues confronting the business transcend traditional departmental boundaries—and a recognition, too, that the Bell System should shape its own future.

But, the Executive Policy Committee does not depend on computer print-outs to provide the answers to basic policy issues. If that were the case there would be no need for the committee or for managers, for that matter. Questions that come to the EPC for decision—careful analysis notwithstanding—characteristically involve a degree of uncertainty and, therefore, of risk which must ultimately be assumed by responsible human beings. Thus, when the experts have picked up their charts and departed, the EPC must finally—through a process no man has yet managed to quantify—decide.

Intelligence and feedback

The Presidents' Conference, a meeting between the presidents of the associated companies and the EPC, is usually held in a different headquarters city each month.

Goal-setting is the principal business of these meetings—service goals, earnings goals, goals with respect to employees and society. The discussions are vigorous, intense and sometimes protracted. But when consensus is reached, it is understood that the goals defined are goals held in common and that each officer is ready to be measured by the effectiveness of his contribution toward achieving them.

On the policy level, the company presidents have a smaller role than in operational decision making. Here their function is one of intelligence and feedback. They are instrumental in the defining of trends and conditions. They also provide the link between implementation of new policy and real results by providing the vital function of tracking a previously-made decision to ascertain its effectiveness. It is the company president who can tell first-hand whether a given policy is working as expected. If not, he can and should offer suggestions as to the best ways to amend or change that policy.

There is no question that these meetings have had a revitalizing influence on the business, far out of proportion to the time involved.

An awesome task

The newly formed Corporate Planning Organization might be thought of as the intelligence arm of the Bell System decision-making team. The organization is staffed with people knowledgeable about Bell System affairs and skilled in a variety of disciplines, but especially strong in analytical technology, operations research, statistical analysis, econometric modeling and the like. The organization's prime functions are the identification of issues, the gathering and analysis of relevant information and the dissemination of data on issues affecting both the present state and the possible futures of the business.

Executive vice president Cornelius W. Owens, who heads the new organization, describes a corporate policy issue as "an important problem which, when studied, leads to a set of alternative solutions each of which provides an alternate future for the firm."

Such an organization, dealing as it does with unknowns, variables and possibilities, faces an awesome task. Owens sees three forces that an effective corporate planning organization must face. "First," he says, "external forces, be they economic, social or ecological, cannot be controlled. Anticipated, perhaps, but not controlled. Second, there is a natural internal resistance within any successful organization to radical departures from the way they've previously planned for the future. This, I think can best be described as inertia. Last, and perhaps most important, are the current earnings and service problems facing the Bell System. Our first and most pressing task is to develop, through the skills of our planners, a future for the company where these problems will diminish. But they force us to direct much of our effort in one direction at the present time. In the future we will be much more diverse."

To deal with the formidable jobs his organization will face in the coming years, Owens believes that certain skills are essential. "We need a high level of imagination and creativity, outstanding analytic ability, but most of all we need people who have the courage to become committed, people who are willing to make recommendations based on knowledge, insight and study and are willing to be judged by higher management on the decisions based on those recommendations."

Three separate functions

Owens believes he has the personnel to accomplish his goals. He has subdivided the planning organization into three functions. One is the organization headed by Henry Boettinger. Owens sees the function of Boettinger and his staff as fourfold: the identification of corporate issues which now or might likely affect the operation of the business, the tracking of issues currently under study, as well as tracking the course and impact of a new policy to determine whether the assumptions are being realized or whether further changes in aims and implementation are required. They will also handle the liaison with the associated companies. Boettinger's staff must bring a great deal of imagination and creative thinking to the overall planning scheme.

Robert Ehrlich, director of planning analysis, and his staff are responsible for the development of planning models, data bases and thorough economic and corporate analysis of the consequences of possible decisions. Ehrlich's staff will have at its disposal one of the best and most extensive analytical complexes in modern business.

The third function is headed by the director of corporate planning studies, Brooke Tunstall. Members of his staff will serve as project leaders on selected priority issues and bring to a focus the contributions of experts throughout the general departments, Bell Labs, Western Electric, the associated companies and outside sources in order to facilitate EPC decision.

One officer from each associated company will serve as a liaison between his company and AT&T's planning organization. "However," Owens states emphatically, "there will be no policy decision communication to associated companies from the Corporate Planning Organization. The implementation phase of a policy change is the responsibility of AT&T president Robert Lilley and vice chairman William Lindholm."

It is the planning organization's responsibility, too, to quantify, to the extent they can be quantified, the consequences of alternate strategies. "Asking the right question in the right form at the right time is crucial to planning," says Owens. "Good planning is a discipline; it cannot be left to chance."

Will provide continuity

The Corporate Planning Organization is expected to take over the function of an often overused agency—the task force. One of the prime hindrances to clear decision making in many areas of society has been the lack of continuity of research. Up to now, a task force on a given problem would merely research its subject, produce documents in the form of binders and go home. A year or so later another task force would try to follow in the first one's footsteps, producing redundancy in work, in performance and time, postponing necessary decisions.

Part of the value of corporate planning is the ability to provide continuity of thinking and analysis on problems facing the business.

These, then, are the agencies for decision making at AT&T. But what criteria are used in making decisions? On what are they based?

Henry Boettinger believes that the entire process of decision making must be dynamic, a process of constant change and interaction. Unless it is so, it cannot be effective.

All decisions, policy or operational, should follow five steps. If one step in the process is left out, the ultimate decision has a high risk of being faulty, Boettinger says. Still, merely taking the steps does not guarantee success. There is no panacea, no "five steps to the perfect decision," but rather, careful following of this system points the way toward a higher percentage of success in selecting the right option.

Five vital steps

The first step any decision-making body must take is definition and clarification of goals or aims. Basically, this is a case of "here's where we are now, and here's where we want to be." In this initial phase of the process, there can be no glaring ambiguities or qualifications. The familiar order: "Do it the fastest and cheapest way," can only hinder the process since such a course of action really does not exist. There is, of course, a fastest way and a cheapest way, but usually on separate paths. A combination of both is nothing more than a compromise, being, in the end, neither the fastest nor the cheapest.

The second phase, according to Boettinger, is a description of trends. This phase is analogic in nature. It deals with the past in order to chart a probable future. It is the home of the *if-then* syndrome, where extrapolations and contingencies are plotted. It is in this phase of decision making that a group like the Corporate Planning Organization is of value. A *decision tree* or decision model can be constructed after the goals of the decision makers have been established. For example, assume that you are required to make a clear *yes* or *no* decision on any given situation. A yes decision would beget another yes or no decision in the implementation stage of the initial decision. The same is true of an initial negative response. In other words, the initial decision does not end with a yes or no, but rather propagates itself in a seemingly endless number of decisions in the successive levels of the process.

The third phase of the process is a careful analysis of existing conditions underlying the trends. This includes a study of economic, social, ecological, political and, in the case of the Bell System, the regulatory forces. All agencies of the decision-making process play an active and vital role in this phase.

The fourth phase is probably the most critical before an actual decision is reached. Here a projection is made of future developments which may influence a possible decision and details possible consequences of a decision at any level of the process. Here, the Corporate Planning Organization will find its greatest value.

The fifth and final phase is the invention, evaluation and selection of alternatives. It has been said of former Secretary of Defense Robert McNamara that: "He likes to see objectives concretely defined. He abhors the thought that there is only one way of doing things; he is intensely interested in alternatives."

How the agencies interact

For the process to be successful, there has to be a set of alternative solutions present in the last phase, so that when all the necessary data are in, a rational decision, taking into account all the intangibles, all the possible nuances and ramifications, can now be made.

All the agencies of decision making in the Bell System fit into this process. The EPC, the Board of Directors, the Presidents' conference, the Corporate Planning Organization and all the general departments, play a role in each of the phases; some to a greater degree, some to a lesser one—but all vitally important.

For example, all share equally in the clarification of goals for the System, with the EPC having the most weight. The Corporate Planning Organization does most of the heavy work during phase two with considerable help from other internal and external sources. Because this is the information gathering stage, feedback from the local companies is vital if accurate intelligence is to be developed. The same is true of phase three.

The Corporate Planning Organization with help from the individual staffs of the company officers becomes heavily involved in the fourth phase, being charged with the formation of the necessary projections.

The final phase is the province of the EPC. What is decided here will affect the System as a whole, because, as stated before, the rules may be changed for everyone.

It becomes obvious that such a process, careful, accurate and time-consuming, cannot be rushed. The much-sought-after *rational* decision can only be made after every possible avenue of action is explored to the extent possible with the time and resources available. Key decisions affecting the health of the enterprise simply cannot be left to snap judgment.

Two examples of basic policy problems now under study may serve to highlight both this process of decision making and the fact that a quick yes-or-no decision is dangerous. Both questions arise from the thorny problem of growing competition.

First, what should the Bell System do to respond to the competitive posture of Microwave Communications Incorporated (MCI), a company that obtained Federal Communications Commission approval to serve as a specialized common carrier between Chicago and St. Louis and other points? MCI's announced rates for the Chicago-to-St. Louis route are lower than the Bell System's, but our rates are based on nationwide average pricing; that is, the charge is the same for equivalent distances regardless of whether the route traveled is of low or high traffic use. Nationwide average pricing has been the key to expanding communications to even the remotest part of the country and has been considered as responsive to the nation's social goals.

Complex, sticky problems

Some questions to be studied are: Should this time-tested method of averaging be abandoned? If the company were to meet competition by cutting rates on that route alone, would that place burdens on other customers? If competition is not met, is it not inevitable that business will be lost, diminishing the economies of scale that permit prices to stay low? While the Bell System provides protection systems for transmission, the specialized common carriers do not. In the event of failure of their network, who pays to insure that all customers are not affected?

Second, should the Bell System charge a customer exactly what it costs to install a specific telephone at the time of installation? Up to now, our answer has been no, but faced with an ever-growing list of competitors ready, willing and able to supply terminal gear we must re-examine this policy. Should the company maintain its stand that customers pay a below-cost installation fee and make up the difference on recurring monthly charges, or should they be charged a compensatory rate, say a $75 one-time charge and own the instrument? Should the company do nothing and maintain its present course at the risk of losing business? Should the laws covering foreign attachments be enforced with more vigor, or are those laws now unenforceable? Should some new sweeping policy on pricing be made?

All these possible avenues of action are being explored now at the highest levels of management.

Both problems, competition from specialized common carriers and from terminal equipment suppliers, are sticky, involved, fraught with economic, political, social and regulatory ramifications. Yet it seems safe to judge that when all the facts are in and subjected to this rigorous planning process for decision making, the ultimate decision will be as correct as we can possibly make it at this time and in the best interests of the public, the company, its employees and share owners.

What has been described here is a process new to American business and geared to handle the scope and complexity of decisions needed to cope with current problems.

To those who question the importance of such an exhaustive system for problem solving, the only adequate answer is another question: "How important is it to anticipate the future and take steps now to insure a continuing congruence with our changing society?"

This process for decision making in the Bell System may not be perfect (and is, in fact, under constant study), but until a better system is designed, it seems to be the best, most workable method for solving the problems we face today and will face in the foreseeable future.

Thomas J. Fay, Associate Editor

AT&T at Basking Ridge:

Accent on Ecology

Nestled in the woods and streams of Somerset County, New Jersey, Basking Ridge is located 7 miles north of the intersection of Route 78 and Interstate Route 287, still under construction. The village, in Bernard's Township, is the site of AT&T's proposed office campus, a cluster of residential-type buildings set into the heavily-wooded surroundings. Construction on the complex is now underway.

Eldon Hanes, president of the 195 Broadway Corporation, has stated that the offices should be ready for the first contingent of AT&T personnel – 1,300 people from Operations, Engineering, Construction Plans and Administrative Services – in mid-1975. Others will move in in gradual stages until the building is fully staffed, housing some 3,000 employees.

While AT&T owns a tract of land measuring some 150 acres, only 10 percent of it will be used for the actual construction, the rest being left undisturbed, thus maintaining the residential character of the neighborhood.

The building itself is of modern design which divides in steps, into two, three and four levels with two levels of garages below, thereby eliminating the need for acres of pavement around the structure.

To describe the office complex in a phrase: the accent is on ecology. ■

Three Weeks in June

June, 1972 is destined to live long in the memories of telephone people as a disaster month almost without equal. One dreary, drizzly day blended into the next until super-saturated soils refused to absorb another drop. That's when the troubles began.

Following a particularly heavy downpour, the Canyon Lake Dam on the west side of Rapid City, South Dakota was unable to contain the pent-up pressure. On Friday morning, June 9, a section of the dam crumbled and sent a seven-foot wall of water surging through the town. It was one of the worst floods in the history of the Midwest. More than 200 persons were killed and thousands were left homeless.

Hardly had restoration efforts made significant headway at Rapid City when Hurricane Agnes made her presence known. After slashing across Cuba and Florida on June 19, the storm lost some of its steam as it continued to move upland. The National Weather Service, at this point, downgraded Agnes to a tropical storm.

As a tropical storm, Agnes moved slowly northward and for five days rained destruction on one of the nation's most highly populated and industrialized areas. More than 100 persons were killed and property damage was estimated at more than a billion dollars. Hardest hit were southeast Florida, Virginia, Maryland, Washington, D.C., Pennsylvania and New York. A total of 130 counties and 25 cities were declared disaster areas.

President Nixon, in an appeal to Congress to establish a special emergency relief fund for the storm's victims, said, "In terms of the property damaged and of the sweeping extent of the territory affected, this has been the worst natural disaster in the whole of America's history."

As the floodwaters receded from the Eastern communities, leaving behind in many cases a three-inch layer of sour-smelling muck, a tornado ripped through Phoenix, Arizona on June 21, followed by a flash flood on the 22nd. Roofs were blown off and trailers toppled while bridges and sections of road were washed away; one man drowned when the flash flood hit the golf course he was playing.

All this havoc occurred in the space of three short weeks in June.

As a result of the storms, some 400,000 Bell System phones were temporarily put out of commission; damages and repair costs were pegged at a staggering 30 million dollars. Other corporations which suffered smaller financial burdens failed to recover. The Erie Lackawanna Railway, for example, a victim of tropical storm Agnes, filed for reorganization under Section 77 of the Federal Bankruptcy Act when it found 135 miles of its 3,000 miles of track under water. The Bell System, however, had the ability to move quickly and to rebound from the calamity with determination and vigor.

Once again, in the face of adversity, the merits of the unique vertically integrated structure of the Bell System were proven. Although damage was spread across the territories of several operating companies, those companies not affected were able to marshal manpower and material and quickly rush to the aid of those stricken. This would not be true if each company was an independent entity going its separate way. With each company

Supplies on the way to New York's storm-drenched western area.

Telephone men lend a hand to a Kingston, Pennsylvania family.

Restoring a critical communications link. Flood uprooted pole and left aerial cable in shreds.

at is an indispensable piece of equipment to C&P
ew working north of Roanoke, Virginia.

ell of Pennsylvania crew turns attention to
ater-logged underground cable.

'ellsville, New York church and hospital undermined
flooding Genessee River.

using standardized Bell Labs-designed equipment, manufactured to rigid specifications and strategically stored by Western Electric Company and installed and operated by people trained and familiar with Bell System work practices, the interchange became both possible and practical.

But the real strength behind the Bell System is its people. Put to the test, the men and women of the Bell System proved they were more than equal to the task. There are literally hundreds of stories that could be told of the extra effort expended and the ingenuity used in quickly restoring service to the troubled areas. The common thread in all the stories is one of solid teamwork and a sense of dedication and pride in doing the job quickly and well.

In the Rapid City disaster more than 9,300 telephone stations were out of service. Huge sections of pole line and cable had been ripped out and washed away by the flood. Fortunately, neither the Rapid City telephone office nor the Warwick office, serving Ellsworth Air Force Base, had suffered flood damage.

Vehicles with mobile telephones were immediately dispatched to stricken areas. Crews were assembled to run emergency lines and install phones where they were most urgently needed. Meanwhile, telephone employees from Nebraska, North Dakota and Minnesota were being assembled to help their fellow Northwestern Bell counterparts in South Dakota.

Cable foremen, splicers, combinationmen, maintenance and construction crews went to work with a vengeance. By 3:30 P.M. Saturday, the day of the flood, 400 feet of buried long-distance cable north of Rapid City was restored. Nine towns were put back on the long-distance network. By evening every previously isolated community in the area had some long distance service.

As telephone operators reached the office, shift schedules were forgotten. The operators began work as soon as they could get there, and worked for as long as they were able. The disaster was resulting in one of the heaviest volumes of long distance calls ever experienced in Northwestern Bell territory.

According to Long Lines' Network Control Center in Omaha there were 750,000 attempts to call South Dakota on Saturday and Sunday. The volume continued unabated on Monday. Network control offices worked to insure that the incoming calls did not prevent outgoing calls from Rapid City; outward bound calls for help, supplies and to save lives took precedence.

On the supply end, Western Electric personnel worked round the clock to get the equipment where it was needed in the shortest time possible. By the 23rd of June, all phone service was restored to inhabitable buildings. The job of rebuilding the community, however, had really just begun.

Tropical storm Agnes was an entirely different matter. Unlike the wall of water that came crashing down on Rapid City, Agnes moved slowly and poured a steady downpour hour after hour. At least 387,700 persons were evacuated in Agnes' path as rampaging rivers slashed through sandbags, destroying factories, shops and homes.

Most will concede that Pennsylvania, with 45 dead and 200,000 phones out of service, was the hardest hit state. The heaviest rainfall in Pennsylvania, according to the Weather Service, was up the Susquehanna River valley from Harrisburg to Williamsport on the west branch and to Wilkes-Barre on the east branch. More than 13 inches of rain fell on Wilkes-Barre in four days of relentless downpour.

Rising to a super-flood stage, the Susquehanna cascaded torrents of muddy water and debris over dikes into Wilkes-Barre, Plymouth and Kingston. Equipment in the Plymouth Central Office was submerged on Friday, June 23 when a levee broke. Some 11 hours later water engulfed the Kingston office making it inoperable.

At Wilkes-Barre every precaution was taken. At the business office all records were moved to the second floor. A three-foot wall of sandbags encircled the central office and adjoining directory assistance center. The past all-time high crest of the Susquehanna River was 37 feet and the town was gearing itself for a possible 40-foot flood. Showing no respect for past records, the fast-rising river set a new all-time high of 44 feet. *(continued)*

During the late evening, water began to seep into the central office's basement, cable vault and power room. Soon it was over the sandbags and rushing to fill the lower levels. Then the muddy water began to creep slowly up the walls of the first floor.

By 12:17 p.m. Saturday, June 24, the huge Wilkes-Barre central office was completely out of service. Water was over six feet deep on the first floor, covering much of the toll tandem and local switching units.

Earlier, toll operators two floors above street level worked with the aid of flashlights and portable units until ordered to evacuate the building. They left in motor boats and by helicopter. Where once there had been a river, now there was a lake 12 miles long and four miles wide.

The flood water started to recede on Sunday. By Sunday night it had dropped enough to allow the first clean-up crews into the area. Armed with portable lights, hoses, compressed air and CRC, a drying agent, they tackled the job of cleaning and drying the Wilkes-Barre crossbar tandem toll machine that had been sitting chest-deep in water.

A 2,000-pound generator borrowed from the U.S. Army depot at Tobyhanna was delivered by helicopter to the roof of the building enabling crews to make use of electric fans and blowers. After the switches had been hosed down to get rid of the filth, 35 portable electric hairdryers were aimed at the frames to get the equipment "phone" dry. As one wag commented, "now when you dial someone in Wilkes-Barre, the phone will emit ringlets."

More than 700 telephone workers from other parts of the state were rushed into the area to help with the restoration. Working alongside the Bell of Pennsylvania people were Western Electric installation teams cleaning and drying switching equipment, replacing cable and running emergency service.

Within a week, local dial service had been restored in the Wilkes-Barre and Kingston Central offices. The Plymouth office required an almost complete rebuilding before it was running again. More than two-thirds of the equipment in the Plymouth office had to be replaced.

Similar and no less dramatic

Manhole and telephone conduit lie above ground after flood washed away a Wilkes-Barre street.

Northwestern Bell salvages remains of cable damaged by the Rapid City flood.

Compressed air and chemicals were used to dry sodden electronic compon

stories could be told for Washington, D.C. and communities in Virginia, Maryland, and New York. At the height of the storm's fury Washington had 37,000 telephones out; Virginia, 48,000; Maryland, 83,000; and New York, 50,000.

In Chesapeake and Potomac Company territory, damage was most severe in Maryland. More than 30 PBX's were flooded, five communications centers were isolated and 26 others were on emergency diesel power when commercial power failed. Twenty-two central offices in Virginia also were on emergency power and waterlogged cable was a problem in many locations, particularly in Washington, D.C.

New York Telephone Company damage was concentrated in places like Corning, Elmira, Olean, Salamanca and Wellsville, which bore the brunt of overflowing rivers. In Portville, the telephone central office was completely ruined, but a self-contained Bell Labs-designed communications center was installed in record time.

Companies which were not directly affected by the storms were no less involved as they rushed volunteers and material into the stricken areas to aid in the restoration.

The operating companies weren't alone in experiencing troubles. The same storms caused some major Long Lines' outages. The Wilkes-Barre, Pa., flood, as already described, put that crossbar tandem switcher completely out of service.

But by far the worst single outage, from a Long Lines standpoint, occurred on the morning of June 22 when 9,685 private line and message circuits failed on the Boston-Miami L4 cable between Moseley and Dranesville, Va. Approximately 1,800 of these circuits were restored in one hour. Temporary restoration routes were established on other broadband systems or patch cords at the site until all 29 master groups were back in service.

The other two major Long Lines losses due to flooding involved the L4 cable from Lillyville to Finland, Pa., with 10 master groups affected, and the L3 cable from Pottstown, Pa., to Monrovia, Md. affecting 12 master groups. The first cable was restored using spare tubes and patch cords, and the second cable was restored using spare tubes alone.

Facility failures, as already noted, are only part of the problem. The volume of calling in and out of stricken communities rises and falls with the water. Calling swells as friends and relatives try to check on persons in the disaster area.

Many of these calls are futile, of course. The families have fled threatened homes and phones ring with no answer—or phones are out of service.

When it became apparent that tropical storm Agnes was going to cause flooding, the AT&T Long Lines' Network Management Control Center in New York alerted all regional centers on the developing situation and advised them to gird for increased calling volumes. The regional centers, in turn, passed the word down the line.

To insure that the network did not become overloaded, network managers advised the regional centers to institute TORC (Traffic Overload Reroute Control) measures. TORC is a plan for rerouting traffic to gain maximum use of available transmission facilities.

For example, by late Thursday, June 23, calling volume between the Wayne and Pittsburgh regional switching centers was straining circuit capacity. Calls that couldn't be completed using the primary Wayne-Pittsburgh route were TORC'd to regional centers all over the country, then redirected back to Pittsburgh via circuits that weren't overloaded. Even TORC finally proved unable to handle soaring call volumes.

Additional network controls were instituted to favor calls outbound from the disaster areas. Regional, primary and sectional toll centers reduced inbound circuits to insure that calls originating in the flood areas could reach the outside world.

Western Electric Company had a significant role to play in the restoration effort. Within hours after the flood waters peaked in Pennsylvania, upstate New York and Virginia, Western called upon 12 of its manufacturing locations, plus the Teletype Corporation, to ship approximately 1,400 tons of equipment to replace more than 150,000 telephones, hundreds of PBX's and other telephone equipment submerged in the muddy waters.

As the storm abated, Western Electric shipments from as far as Denver and Shreveport were already on their way to the Northeast. These shipments included an additional 174,000 telephone sets, 367 million conductor feet of exchange cable, 488 tons of connector cable, cords and drop wire, and 3.5 tons of transmission equipment. Western Electric installers began working 18-hour days in the hardest hit areas to restore service quickly.

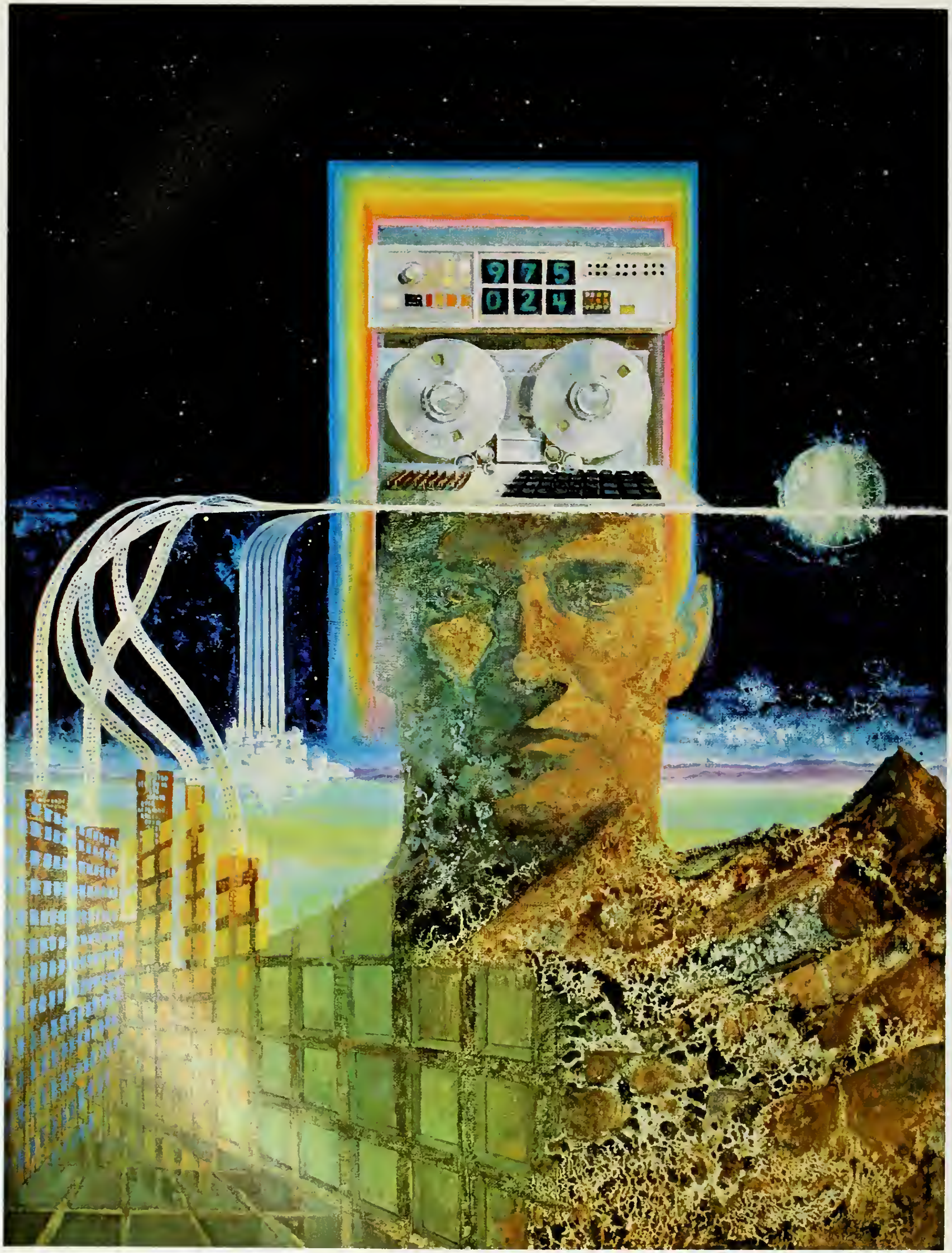
Describing as "unbelievable" the volume of emergency rush orders reaching Western's King of Prussia Service Center, the managers of the center by-passed the usual computerized ordering procedures and used longhand requisitions to select and expedite shipments. The longhand requisitions were later fed through the computer for billing.

For some employees the June floods will have a special, personal significance. The homes of some were totally destroyed and the homes of many more were extensively damaged. For these employees, it meant an exhausting double effort—reconstructing their own lives while at the same time bringing communications back to normal for their neighbors.

How could these employees continue to function when tragedy hit at them so directly? Almost without exception each expressed a thankfulness that their loved ones were safe and said they felt a sense of obligation to help do the thing they were best qualified at doing to help reduce the suffering of others.

Telephone Pioneer Chapters across the country set up a special disaster relief fund to aid telephone employees who were victims of the floods. In addition, Western Electric, through its WE Fund, responded immediately to the flood disaster by donating funds totaling $105,000 to over a dozen Red Cross Centers in Washington-Virginia, Baltimore, Pennsylvania and upper New York State.

Yes, June, 1972, will long live in the memories of telephone people as a disaster month almost without equal. And for those who had a direct and personal role to play, it was a time to see at first-hand Bell System teamwork in action . . . a truly inspiring sight. ∎


975
024

MAKING THE MOST OF THE MACHINE

A report on the growing role of computers (and those who care for and feed them) in engineering the world's biggest, most complex and contemporary business enterprise.

Some years ago, when AT&T's share owner records were first being committed to computer form, one large machine room at Varick Street in New York had a small, glass-doored box attached prominently to a central pillar. Next to its little chained hammer was the instruction: IN CASE OF EMERGENCY BREAK GLASS. Inside the box was an abacus.

Such touches of wry humor occasionally surface among the fraternity who program, operate and use the output of that ubiquitous handmaiden of science and industry, the digital computer and its numerous progeny. The humor does not derive from any fear that the machine is likely to go beserk or simply break down; it is merely a reminder, from its operators to themselves, that *they* are in charge, and that the intelligence that would make the most of the machine should match, in its own way, the intelligence that designed it.

And making the most of the machine is the name of the game in the Bell System. Design of the computing hardware itself is left to others; design and development of the software—the programs for the hardware—are primary and are filling a steadily growing segment of Bell Laboratories' effort. The segment is growing because the increasing size and diversity of the System's plant demand analysis and decision making more complex than anything previously known.

The difficulty of good long-range planning is the central problem in managing the network today. The companies need modern tools to help in planning, engineering and maintaining the exchange plant. One of the best of such tools is the digital computer and programs developed for it. And one area of Bell Labs dedicated to producing those programs is under Hank Hardaway, director of loop transmission at the Laboratories' engineering center in Whippany, N. J. Hardaway now has a group of about 60 people, which will probably grow to 80, and whose mission is to design, write and document computer programs all the Bell companies can use uniformly on commercial machines. *Uniformly* is the key word here, for, as Hardaway points out, "It wouldn't be practical to have each of the 24 companies going off in its own direction to solve the same kinds of problems that really are common to them all. And Bell Labs can't write 24 different kinds of programs. So, we try to produce programs all the companies can use to save engineering time and in the interest of consistency."

The programs and the machines that use them are sorely needed because they can handle the enormous amounts of data the companies have to amass in order to make useful studies, and reduce the sheer manual labor—the weeks and months of drudgery—otherwise needed to analyze it. It permits the companies to evaluate many alternatives, as Hardaway says, "so that plant installed more nearly approaches an ideal mix of equipment and an ideal timing of new additions to the network."

A case in point is the Mississippi Study, a joint project undertaken by South Central Bell, AT&T and Bell Laboratories. Essentially, it applies computer analysis to the problems of providing service in a large, purely rural area with a thin, scattered population. The study will help develop techniques to determine both the most economical mix of cable and electronics and the optimum planning strategies to provide service, when requested, at minimum cost and at reasonable rates. But it will also give an opportunity to test Bell Labs' package of engineering and planning computer programs for usability and completeness. The study initially included only the Philadelphia exchange serving Neshoba County; as a second step, present efforts are aimed at extending the technique to the entire state, with the ultimate goal of developing a long-range planning methodology — a much-needed guideline package complete with software—for System-wide use, and a data base for further Bell Labs exploration of new solutions to the rural service problem anywhere in the Bell System.

Computer program packages have been proliferating since the late 1950's, when, says Hardaway, "joint efforts by Bell Labs, AT&T and the operating companies led to the first use of standard, systemwide computer programs in the exchange plant."

The "joint efforts" are a necessary part of developing viable programs. Representatives of the companies often visit Bell Labs to articulate and assess their problems, partly to determine if a specific area is amenable to computer application. The Laboratories then forms a mini-task force to develop a possible program—a force which may include a programmer, electrical engineer, statistician, economist, mathematician – various mixes of disciplines, depending on the nature of the problem. Such a group may work for a year or more after preliminary discussions, the length of the job being bounded more or less by its complexity. These joint efforts, says Hardaway, breed familiarity with the practical constraints of a given situation, often revealing previously unsuspected problems beneath the surface.

A program, once designed, must be coded, documented and debugged – that final purgatory through which every good program must pass. Good descriptive support must be written, both for the intended operating company user and for the future Bell Labs programmer who will be updating the program some years hence. Two or three companies then participate in shake-down field trials, just as they traditionally have done with each new piece of equipment. When at last the program is ready for full Bell System use, local engineers send their input data to a central computer center, where Western Electric processes the input and returns the output to the company. Although the programs have been announced individually to the companies as they are developed and debugged, they are building over the long run toward a complete package that can be universally applied in the System.

"Each of the major areas in which computers are used," says Hardaway, "—planning, engineering and maintenance—has much in common. Each involves a large amount of information about existing equipment, costs and operations. Each is sensitive to strategies of timing and deployment of equipment and manpower, and each is an essential element of an orderly, planned evolution to a flexible plant that can be expanded gracefully and economically. Computer programs can aid in obtaining the consistency and coordination needed."

Where do we stand now in applying such machine aid to System problems? "In the exchange plant," says Hardaway, "computer programs are still in their adolescence. Use in the companies varies from over 8,000 runs a year for the Exchange Feeder Route Analysis Program, for instance, to less than 300 a year for some of the 'wire centering' programs, which help choose locations for central offices.

"As a valuable fringe benefit," Hardaway adds, "Bell Laboratories uses these programs in several ways. First, we can get a large body of detailed data in a form already suitable for computer calculation and analysis. Second, Bell Labs engineers can try new system proposals and evaluate potential new strategies, using the same costs and methods that are employed by the operating companies."

One of the computer's great contributions to economical management of Bell System plant is in the sheer number of man-hours it can save. A conspicuous example is a time-shared program called ANALIT – one of many acronyms spawned by the necessarily long descriptive names of the programs. It stands for Analysis of Automatic Line Insulation Test, and grew from an existing technique known as Automatic Line Insulation Test (ALIT), which measures electrical leaks in telephone lines caused by deteriorating insulation. ALIT has not been completely successful because it grinds out literally yards of printout data, which maintenance men then have to sift to find the real trouble spots. ANALIT automates that process, boiling ALIT's voluminous raw data down to the remaining cases of probable troubles, saving many hours of clerical dogwork. The program has been on field trial in 14 locations in five companies, with nine more planning trials in the near future.

Even though programs have been through the trial run and debugging process before they're released to the companies, says Hardaway, they can't be completely foolproof. He tells of helping Mountain Bell run a wire-centering program for a new central office location in the Denver area.

"The output looked good," he recalls. "Then we went out to see the site the computer had indicated as an optimum location, and found it in the middle of a beautiful lake. Why? Because nobody had told the computer, that's why. Again, running the same kind of program out in Pacific Telephone country, the computer pointed to a supposedly potential central office site right where a large highway interchange already existed."

Such mishaps prove again—if indeed any proof is needed—that, fast and versatile though the machines may be, they cannot think. It reaffirms that classical caveat of computer technology, GIGO – Garbage In, Garbage Out—a pungent reminder that the machine's output is only as good as its input.

A primary concern with the input is a concomitant of need for the output—and it almost doesn't matter what specific hardware does the processing. Hugh P. Kelly, director of the transmission maintenance laboratory at Holmdel, N.J., says, "We're not in the computer business. We're interested only as users. I see a computer system as a robot designed to help the operating forces; our job is to teach it what we want it to do. And what we're asking it to do—what we're asking ourselves to do—is to redevelop and restructure many routine plant, maintenance and administrative procedures in software flowchart form, suitable for the computer. Further, as we develop this base of operating plans and methods, we have to build in means of protecting them from frequent changes in the computer art. We can't completely rewrite all programs every time hardware designs change."

As chairman of the Tricompany Minicomputer Task Force, Kelly lives with a daily concern for the programs involved in integrating the mini into the Bell System plant. As the name of the task force implies, the modern minicomputer is a central item among the tools being developed to help manage the exchange plant, present and future. "We were the first in the business," says Kelly, "to pick up the minicomputer and put it in as part of the maintenance machine." The mini is compact, and cheap enough to be purchased outright and dedicated to a particular job or location, unlike the large, time-shared machines which are usually leased at considerable cost. But the minicomputer, Kelly emphasizes, is not a significant part of the economics of a situation; it is about in the category of a test set in price, and can be proved in easily in the value of the job it does. With the practical availability of this new tool, Kelly adds, "there's a bandwagon effect involving all the companies."

One application being developed for the minicomputer is in the remote surveillance of plant performance via telemetry: reporting, testing, and controlling functions in many remote locations from one central point. An example of such "remotes" is found in the microwave radio relay stations dotted across the face of the country. They are unattended except when a craftsman makes his regular rounds to check and maintain the equipment. Telemetry systems are used to provide continuous status and alarm reporting to a central station. The central is also capable of remote operation of controls at the unattended stations. The center is responsible for coordination of all maintenance operations at the stations under its control. With manual operation, one center can handle 10 to 15 remote stations.

"But with the computer performing much of the routine paperwork and analysis of alarms," says Kelly, "one center could serve a much larger number of remotes, providing all the necessary status reports. There is a proliferation of alarm centers over the country, each serving six to eight remote stations for such purposes as logging men in and out and turning down circuits for maintenance. Why not have central master centers, each serving, say, a hundred remotes? We have the tools to do it; we know that we can teach a machine to do what's needed. To find out how to do the teaching, we called in maintenance engineers from Long Lines, Pacific Northwest Bell and Pacific Telephone for a couple of days of orientation and discussion. The primary questions were: How much is really involved in remote telemetry? What happens when a craftsman gets to the station on his regular rounds? How does the machine deal with the alarm at a center indicating the door of an unattended station has been opened? How do we tell the machine what to do?"

To help find the answers, Bell Labs taught the visiting engineers how to flowchart – how to "map" everything that happens at a remote station in order to build a complete analysis of the situation. A committee formed for the purpose labored for over a year to come up with a detailed set of 50 pages of flowcharts which, however, Kelly points out, "still wasn't software ready for the computer." But the working programs are being written; and the important point, Kelly emphasizes, is that this will be the first time the companies will be equipped to deal with remote station alarms, testing and maintenance on a standard Bell System basis. Heretofore, each company has had its own standards, and even individuals within a company have applied them differently.

Another instance in which the minicomputer has been purchased and dedicated to the job is CAROT—translation: Centralized Automatic Reporting on Trunks. Today, trunks in most central offices are tested manually; analysis of results and administration of records is also manual. Further, today's 6 million trunks will be 12 million by 1980. CAROT will enable operating company plant departments to test trunks more frequently than is now possible, and one central control will be able to test a 100,000-trunk area. The minicomputer which is the CAROT controller initiates tests of trunk performance, analyzes re-

"We're not in the computer business. We're interested only as users. I see a computer system as a robot designed to help the operating forces."

> "If we do a good job in providing the right tools to manage the plant properly we will get a lot of useful fringe benefits."

sults and notifies maintenance managers of trouble spots. The "biggest headache," says Kelly, is keeping the computer data base up to date. But, he adds, the data base is also the biggest asset of the system; use of this centralized information involves checking measurements against records and thus leads to a constant purifying of the records.

One of the unpronounceable acronyms, CTMS, stands for Carrier Transmission Maintenance System and consists of a computer-controlled maintenance center that, as Kelly put it, "can tell us everything we want to know about what goes on in a big carrier office. It can make 10 measurements per second, and provides routine and demand surveillance of the carrier plant." Field trials have been in progress at Netcong, N. J. and Rockdale, Ga. for about a year; the first regular installation of the system is scheduled for early 1973.

"Some years ago," says Kelly, "we started work on automating operations such as broad band service restoration as separate systems. But it's only by providing these kinds of capabilities as by-products of a broader program on centralized maintenance that they've started to sell. The program is still evolutionary in character, with new features being integrated one by one into the overall plan. Each element must be evaluated in terms of service and dollars, and when it makes sense as part of the whole the companies and Long Lines will buy it. But that's the only way it will work—piece by piece, each piece complementing the others. If we do a good job in providing the right tools to manage the plant properly we will get a lot of useful fringe benefits in the process that we never could have justified otherwise."

Bell System planning falls into two general areas, according to Irwin Dorros, director of the facilities network planning center at Holmdel, N. J. He describes these as, first: *Configuration*—which covers *what* we build, what technology we develop, how we design the right hardware at the right price; simply, he says, "Which bag of tricks will we have by 1980?" And, second: *Operations*—which covers running the plant we *have*, and how we use it and whatever we have in the future. The emphasis at Bell Labs, he says, has been on the first, on developing hardware for Western Electric to build. Now the emphasis at the Labs is shifting to the second, toward service.

Bell Labs executive vice president Julius P. Molnar stresses "usage and application" in discussing the Labs' role in doing a more effective job for the System. He describes what Dorros refers to under *configuration* as involving "research, systems engineering and development, resulting in new systems for switching, transmission and customer services.

"The other class of work," Molnar goes on, "is concerned with providing technical assistance to the operating companies to make the existing plant operate more efficiently and effectively....This added effort represents new and broader responsibilities for Bell Labs in the Bell System. Not only will we be involved in the planning development and design of systems, but in their subsequent use by real people in the real world handling real problems."

One of the many real problems handled by the real people is repair service. Repair service centers, Dorros points out, are now largely a manual operation. These methods are sometimes less than adequate even today and will be grossly inadequate by 1980. "We haven't applied the sophisticated technology to the operations side of the business," he says, "that we have to the configuration side.

"There are five basic steps in repairing and maintaining the plant. First, we get trouble data—for instance, in a customer report. Second, we analyze the report—or reports—to isolate the location of the trouble and, in the process, look for recurring patterns. Third, we refer the trouble, having located it, to the right place for correction; where, fourth, it is repaired. The fifth step is restoration to service—which of course is the object of the whole process. The important point is that we're working now to apply modern technology to this fundamental function in our business."

The modern technology, again, is being embodied, for many applications, in the minicomputer. For example, CARTA—Computer Aided Reorder Trap Analysis — automates trouble referral to the toll switching machines, a reorder being any routing of a call to a tone or an announcement for reasons other than a traffic overload. In a Pacific Telephone trial, a minicomputer was programmed to control a teletypewriter to print out only recurring patterns showing up on reorder trap reports. Use of the mini reduced the ancillary hardware from seven teletypewriters to one. With success in that trial, a central analysis bureau in San Francisco will be serving 37 machines throughout California; a teletypewriter at each of six DDD service bureaus produces a complete trouble referral ticket, with all needed data on reorder patterns. "The machine," says Dorros, "has created something that can't be ignored. The disposition of the trouble has to be shown; management can see it, watch patterns and follow repair work. This is one further step in automating the whole repair cycle."

Another system for automating and analyzing trouble reports is NOTIS—Network Operator Trouble Information System, now used by Long Lines and many of the associated companies. At TSPS switchboards, trouble reports from operators have been fed to teletypewriters, which generate stacks of trouble data printouts. The problem has been, as Dorros puts it, how to cope with the growing mountains of paper. With the new information system, any operator who gets a trouble report simply presses four keys in sequence, and is back on the line to resume operating. TSPS operators are able to report 30 times more troubles than with the old manual boards. Data from these reports are sent to a center in Cleveland, Ohio, a Long Lines centralized computer for the System, where trouble patterns can be processed. Bell Labs is conducting studies with the companies and Long Lines to get the most useful information from the patterns thus compiled, but AT&T and Long Lines have been successful so far in the system's first working version.

The Long Lines central computer in Cleveland has been serving many operating companies for trouble reports, but such individual company service, says Dorros, can be only an interim arrangement; in the future, probably only intercompany data will be sent to Cleveland. During the last year, New York Telephone has been sending trouble data to Bell Labs in Whippany, where it is processed on an IBM 360 computer. New York, however, is now equipping itself with computer capability for the purpose, with a center to keep track of the Manhattan network. This year, the Laboratories will turn over the entire line operation to New York.

Dorros points out that there are two basic approaches to automation through minicomputers. First, using one machine to perform several different maintenance, testing and repair functions for one central office at one location; second, using one central machine to perform one function for several locations. "We can use the same kind of minicomputer for either application," he affirms. "They are fully flexible enough to handle either kind of programming. The question now is: Which way do we go? In the long run, we can't do it both ways. Only further experience with systems working on both principles will help resolve the question."

Clearly, uses of the computer—in whatever form or size—are proliferating rapidly in the Bell System. In fact, the Bell System, says Hardaway, is "probably the largest user of computers after the United States government." One significant labor-saving function of the computer is in helping to construct models—a way of showing future consequences of present actions. These may take many forms, from mathematical printouts to physical objects; but all help to answer the abiding question in management: What would happen . . . *if*? For example, a statistical program recently developed by the secretary's department at AT&T, Bellstat, utilizes Guiders, a common English computer language, and provides Bell System management people with almost instant access to a large base of statistical data relating to the entire System. As an adjunct, AT&T, with Bell Labs, has developed actual three-dimensional models made of styrofoam which show visually such items as dial tone measurements in cities. With

Uses of the computer are proliferating rapidly in the Bell System. In fact, the System is probably the largest user of computers after the United States government.

The computer is there to help liberate its masters from repetitive manual operations that no longer can cope with the size and diversity of the System today.

the models, users can virtually "see" results of statistical analysis.

Again, AT&T's Market and Rate Plans department has been using mathematical models to help them establish where long distance rates should be pegged to meet carefully determined revenue objectives. Such models, based on past statistics and assembled on computers, can do an accurate job of predicting the effects of any rate change on interstate messages.

At Bell Laboratories, Dorros's center is developing a Toll Facility Network model, written to be run on an IBM 360 computer. A well-constructed model, he says, "is the best tool you can have in working with the future."

In the Grand Design category of computer activity, the Business Information Systems function of the Laboratories has been working for several years to create its share of program packages for the companies. One of the first major applications to come from the long range BIS development effort is called DIR/ECT, for DIRectory ProjECT. The result of nearly 500 man-years of work, DIR/ECT will revolutionize customer directory operations over the next decade. The system produces directories through computerized photocomposition techniques, and also can produce, update and maintain traffic records used by Directory Assistance operators. It is now being installed at Pacific Northwest Bell's site of centralized directory operations in Portland, Oregon.

PICS—Plug-in Inventory Control System—also developed under BIS, is a new system to keep track of the 40 million plug-in units used and stocked by the companies. PICS will provide a standardized method for controlling supply of plug-ins and will reduce inventories of spares.

Many more BIS contributions are coming along, among them such computerized operations as the Trunk Forecasting System, a mechanized procedure to help the companies determine local and toll trunk requirements each year for five future years; TIRKS, the Trunks Integrated Records Keeping System, an inventory management and information-retrieval application for trunks and special service facilities; the BIS Communications System, BISCOM, a flexible message switching system which can handle an operating company's internal data communications traffic; and computerized mathematical models to help the companies plan for future BIS installation sequence.

Research and development in the Laboratories requires many technical support functions, grouped into an organization whose work ranges from the preparation of precise drawings and specifications to the administration of large computer centers. Each major Laboratories location has, in fact, a large on-site computer system, while all others have either a smaller local computer or access to a larger one.

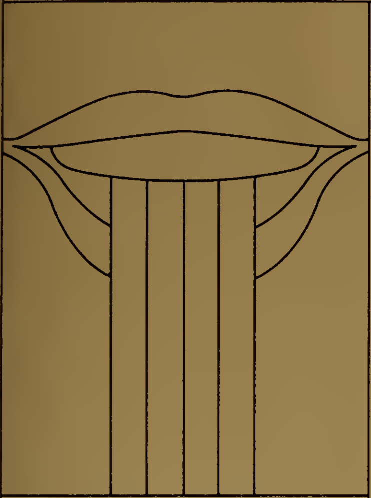
Some of the Computing and Design Engineering organization's activities include tailoring the computer facilities to particular needs at various Bell Labs locations, such as support of Electronic Switching System software development at Indian Hill, Ill., and preparing the super-accurate masks used in making thin film circuits. Many such activities can be classed as computer aids to design which are bringing about what has been called a "silent revolution" in design procedures. A new interactive graphics system using cathode ray tube displays and a new design tool to couple drafting boards directly to computers are cases in point. As a result, engineers today are able, with the aid of computers, to handle jobs that are much larger and more complex than anything in the past.

And in that fact lies the key to the rationale of the computer's role in the Bell System as it is emerging. Whether it be a minicomputer automating repair service or a giant central machine processing massive amounts of statistical data, the computer is there to help liberate its masters from repetitive manual operations that no longer can cope with the size and diversity of the System today. By assigning to computers the jobs *they* can do best, the Bell System is freeing people for the jobs *they* can do best—those that require personal judgment, initiative and consideration.

Don Woodford, Managing Editor

EDITORIAL

Talking Together in These Times



An article in this magazine a little more than a year ago discussed the important difference between employee information and *communication*—and went so far as to suggest that it is time to "Communicate or Perish."

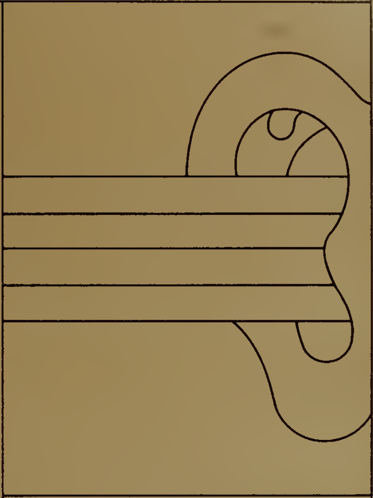
The suspicion that Bell System people, as we've grown in number, have become less inclined or less able to communicate one with the other on a face-to-face basis, has been lurking in the shadows for a long time. That suspicion now has shifted from circumstantial evidence to hard and documented fact. The evidence is that all the employee magazines and newspapers and bulletins and CCTV programs and films and telephone-newslines, although necessary and effective in their place, have not, do not and never will replace face-to-face communications between supervisor and employee as a source of needed, trusted and acceptable information.

And without that needed and trusted information, people in this business are neither as inspired to serve nor as happy in serving as they have traditionally been. The warning that flashes from that evidence to System management is, if we know what's good for us and for this business, we had best get back to the simple, direct, rudimentary task of listening and talking to each other.

Interviews with employees in several representative companies have produced the same urgent word: if the business is to stay vital and well in these new times, we had better take the time to talk together.

Much of the demise in personal communication and the resulting lessening of loyalty to company and to corporate goals are blamed, of course, on the new values and the demands of the day. "Things are different than they were." Indeed they are. But because things are different, must they automatically be negatively so? Must we permit "things" to slip just because they are unfamiliar? "Things" and "times" have always been different than the things and times that preceded whatever time one is in when looking back over one's shoulder. Yet each time has not brought disaster simply because it was different. Newness has brought disaster to companies and countries, and whole civilizations have failed to recognize and adjust in positive ways to the new and different demands of the new times. Each new time has introduced the potential for both success and failure, for progress and regression, and it has been up to man to harness and guide the newness along positive rather than harmful paths. Sometimes he has managed it; sometimes he has not. In this country and in this company we have so far done a fairly commendable job of coping with the complexities of newness. There is no reason to think that pattern will change now.

The biggest mistake that men and women of the Bell System today could make would be to become intimidated by the new age in which we live and work, to view the newness of these times with so much alarm as to cloud the vision of greatness and goodness that today's age has within it. The way to progress and prosperity has never been to toss in the towel, but rather to identify the emerging issues and their problems and make them work for you. In the Bell System we are at the stage now where we have identified one such issue—communications, or the lack of it, within our own ranks. The next step is to make it work for us. "There are no problems, only opportunities" is not just a catchy upbeat slogan, but a truism, if men and women want it to be so and will work to bring it about.



"These times" do not invalidate the need for personal communication among Bell System people. Rather, they beg for its reinstatement. That this age is one of technological wonder, of electronic information and an age, too, of flood-stage printed matter is all the more reason to practice the art of listening and talking together.

BULK RATE
U. S. POSTAGE
PAID
ST. LOUIS, MO.
Permit No. [illegible]

KANSAS CITY PUB LIBRARY
PERIODICAL DEPARTMENT
KANSAS CITY MO

AT&T

American Telephone and Telegraph Company
195 Broadway, New York, N.Y. 10007

Moving? Please inform the *BTM* circulation coordinator in your Bell Company's Public Relations Department. **Please include the mailing label from this issue.**

Printed in U.S.A.

Printed on recycled paper.

Bell
TELEPHONE MAGAZINE

NOVEMBER-DECEMBER 1972

KANSAS CITY, MO.
PUBLIC LIBRARY
DEC 7 1972

Bell
TELEPHONE MAGAZINE

VOLUME 51 NUMBER 6 NOVEMBER/DECEMBER 1972

2 **Sealing the Breach**
The System's reputation has suffered a bit but new efforts are making a positive difference.

6 **An Epoch in the Making**
By James T. Rogers
How the discovery of the transistor is still changing the world we live in.

12 **Fast Freight**
The computer and telecommunications are "working on the railroad."

16 **The Human Touch**
By Henry M. Boettinger
Bell and Watson were men of genius, intellect, passion—and refreshingly individual.

24 **Toll Fraud: Beating the Rip-Off Set**
AT&T and the operating companies go on the offensive against toll cheats.

28 **Over There**
A report on the experiences of business volunteers at work in their communities.

John D. deButts
Chairman of the Board
Robert D. Lilley
President
William L. Lindholm
Vice Chairman
Frank A. Hutson, Jr.
Secretary
John J. Scanlon
Treasurer

Leonard Moran
Editor
Al Catalano
Art Director
Donald R. Woodford
Managing Editor
Edward J. Swartz
Associate Editor
William P. Kuhs
Associate Editor

Published by
American Telephone
and Telegraph Company
195 Broadway,
New York, N.Y. 10007
212 393-8255

Though the criticism of the past several years
was often as wide of the mark as it was widely published,
it affected not only our public image
but the way we sometimes saw ourselves.
How have we been restoring the integrity of our reputation?

SEALING THE BREACH

Thoreau said that the mass of men lead lives of quiet desperation. That was, of course, before television. Today, with the profusion of the print and broadcast media, desperation is not always quiet, nor quietly expressed. Today, it would seem, no one ever has an unpublished thought, while every cause—indeed every notion, however weighty or frivolous—rises up to demand immediate and widespread attention. With unrest so conspicuous, so busy, the "Establishment" has had to brace itself on every front for everything from the angry letter to the fire bomb (even though Thoreau also said, "It is a characteristic of wisdom not to do desperate things."). Justifiably or not, nothing traditional, nothing to any degree "institutional," has escaped mistrust or the erosion of heretofore favorable attitudes. This is especially evident in the case of business. And that includes the Bell System.

Over the past few years, the image of our business—that is, simply, how we are perceived by others—has not been what it used to be. The Bell Seal as a symbol has been slightly breached. Service problems, sometimes-strained labor relations, the claims of consumer advocates, a deteriorating environment, and that growing distrust of large institutions in general—all conspired to tarnish the excellent reputation we enjoyed for such a long time—and perhaps too often took for granted. For a business like ours—a business so dependent on public trust and confidence, so deeply involved with matters of broad public interest, and so accessible to intensive public scrutiny—it has been a matter of some concern.

The "public" is a nebulous concept, and it is doubtful that it will ever be possible to measure with any degree of precision the shifts and turns in "its" attitudes, or the full implication those attitudes carry for either the short or long-term future of the enterprise. But by listening closely to what the representatives of various *segments* of the public are saying about us we can examine trends that suggest broad courses of action to restore the full integrity of our reputation.

Perhaps one of the more disheartening — and alarming — changes in public opinion with respect to the Bell System has had to do with attitudes toward our ability to manage our own affairs effectively. For years, we were looked upon as one of the best, if not the best, managed enterprises on the face of the globe. Other industries hardly disguised their envy of our ability to conduct efficiently the affairs of the largest and most complex business organization the world has ever known. Our customers took it for granted that we possessed the technological resources, scientific expertise and management acumen to solve any problem with which we were likely to be confronted.

Some complacence may have set in. A lot of Bell System managers were astonished by the public outcry that greeted the onset of service difficulties in some locations a couple of years ago. At the time, public reaction did seem somewhat out of proportion to the relatively narrow dimensions of the problem. After all, the troubles had developed in only a few scattered localities, and the service provided to the great majority of customers was not only good but getting better.

The natural reaction of perhaps too many managers was to attempt to explain the public furor by pointing to inaccurate or overblown press accounts (a great many were overblown), or to the actions of budding consumer groups anxious to exploit any opportunity to garner attention.

AT&T President Robert D. Lilley offers another perspective: "To my mind, the true explanation lay elsewhere. It is not to discount the fact that our service performance in some instances warranted some degree of censure that I suggest that customer reaction was heightened by still another fact—the fact that the public already was inclined to be suspicious generally of the motives and performance of all businesses. The suspicion already was there that business, like other institutions, was losing sight of its public obligations. And when their reliable Bell System faltered the suspicion seemed confirmed."

In any event, we found ourselves the target of criticism from many fronts. Some of that criticism has continued for three solid years. We have even heard the Bell System described as "a lumbering old giant, populated at the top by stodgy old men who got there by favoring the status quo—not exactly the markings of a progressive, innovative company." Or, again: "AT&T is very conservative, very establishment. It would be out of character for it to be innovative. This results in consistent, good output, but never great output." These comments were by AT&T employees.

Accurate or not, this is the image of the Bell System that at times has been purveyed to the public, and that some of our customers, share owners, employees — even management employees—have seemed to accept. Accurate or not, it's crucial. Says Mr. Lilley:

Says AT&T President Robert D. Lilley: We must not conclude that the exaggerations and misrepresentations of our critics are impossible to counter.

"I need not emphasize that any deteriorating attitudes among employees, customers and share owners alike pose a problem that must be regarded as serious. We simply *must* find ways to banish negative feelings produced by the problems we're living with and supplant those feelings with the kind of confidence, determination and spirit that for so long typified Bell System management. And I know it is not an easy task, even though I'm happy to report that determination and spirit exist in more of our people today."

When attitudes toward service and earnings, for example, turn for the worse, they do not immediately or automatically bounce back when performance improves. Bell System companies have made enormous progress in their efforts to bring service in the trouble spots back to where it ought to be, yet the criticism lingers. There can be little doubt that the problem was magnified by the fact that the initial service difficulties did take place in New York, the media capital of the world, where broadcasters and editorial writers tended to exploit them.

Then, to the service and earnings difficulties other difficulties were added.

It is not likely that customers or share owners have been greatly exercised by allegations leveled at us by the Equal Employment Opportunity Commission. And yet columnists like Nicholas von Hoffman have not stopped reminding the public that the Bell System has been charged (repeat: just *charged*) with serious wrong-doing, as evidenced by this portion of a recent column in the *Washington Post*: "New York Telephone and Pacific Telephone hire thousands of blacks, but they are no better off than the few blacks (hired by Bell) in Mobile. They are all locked into low-paying jobs." (Startling news, for one example, to about 6,000 black employees in management positions in the Bell System.)

But equally distressing, in view of all the effort expended, is the impression occasionally received that management people here and there are not entirely convinced that equal employment is a reality in the Bell System. Perhaps for that reason, AT&T Board Chairman, John D. deButts, has made it as clear as can be: "Affirmative action to achieve equal opportunity is a major factor in *every* Bell System manager's job—a factor on which he can *expect to be measured* on the basis of the results he achieves."

In point of fact, the Bell System has practiced non-discrimination in its hiring, treatment and promotion of employees for many years, and reaffirmed this existing policy upon signing the Plans for Progress in 1962. On joining the National Alliance of Businessmen, the System went beyond the letter of the law to develop new ways to end job discrimination and increase job opportunities for minorities. Through its Affirmative Action Program continuing steps are being taken to assure that everyone, regardless of race, color, religion, national origin, sex or age, is given equal opportunity to work and make good.

Much of the effort with the NAB has been concentrated on communities where poverty and poor education foster unemployment and underemployment. The System companies have joined in various community programs — often have created their own—aimed at motivating young people to finish their education, improve their scholastic skills and help them to know what business is really like. Bell companies have been giving special training to applicants who ordinarily would not qualify for telephone jobs.

No one, employee or public, can form an intelligent opinion without these and other facts; it is imperative that they have those facts.

And facts are essential for more than forming opinions; they are vitally useful in dealing realistically with such zealous consumer advocates as Ralph Nader: "When we start on AT&T, there's not going to be any end. AT&T is a monopoly with no competition. There is no user representation to speak of. AT&T owns the subsidiary that manufactures its telephones. The parent company buys the equipment from the manufacturer at *top-dollar* prices, then includes those figures in its financial statements." (That claim by Mr. Nader curls the hair of those who know that Western Electric prices average substantially below those of the other telephone equipment manufacturers and, in fact, in face of spiraling inflation have actually declined 3 per cent since 1950.)

This would appear to emphasize two things: first, that the end of critical public scrutiny is not in sight; and second, that the Bell System will have to go right on defending policies and practices that have been studied, evaluated and investigated, over and over again, for as long as memory serves. There will always be critics of the System's "monopoly" charter, of its size, of its form of organization. But the effects of the criticism can be offset or mitigated. Mr. Lilley has suggested two ways:

"First, if we show a willingness and determination to deal effectively with the legitimate beefs of customers, employees and share owners, we will be far better equipped, in my judgment, to fend off the notions of the militant antibusiness

Says AT&T Board Chairman John D. deButts:
The message conveyed
by telephone people
themselves is that this
business is on the move again.

---

believers, who are in the minority. There is not the least doubt in my mind that we are sincerely attempting to do just that.

"Second, we can speak out forcefully. Were we to be pessimistic and conclude that the exaggerations and misrepresentations of our critics are impossible to counter, then we might as well fold up our tents, go home and join the opposition. But there is no need to so conclude. The answer lies in intensifying our efforts to provide truth in massive doses. It is to fight —and keep fighting—for a cause we believe to be just and fair.

"For example, where service is in fact good and/or improving, we must sharpen our public relations efforts to support and enhance the improvement. And in those scattered locations where we do have service problems, public relations programs can tell customers what the facts are and what we're doing to take care of the problems. Having a good offense ready is better than having to find a defense. But we must not speak generally; *specific information is what they want and what we must give them.*"

It has also been said that since public regard for institutions is declining, it would behoove the Bell System to act less like an institution, less like a bureaucracy. For example, to the extent that a customer can get satisfaction from the first person he talks to, the company is not a bureaucracy in his eyes. This ties, of course, to the way we are organized to handle customer contacts—how much decision-making authority is delegated to lower levels. The prevailing disrepute of institutions would also seem to call for more personalized representation, avoiding reliance wherever possible on those anonymous releases usually attributed to "a company spokesman."

The matter of how we view *ourselves* is of urgent importance, too. Bell System leadership has emphasized and repeated that in turning around public attitudes, we must first convince our own telephone people, particularly in middle management, that our service is good and getting better; that we *are* spending and will continue to spend the money necessary to improve it; that top management *does* care about service and, in fact, regards service commitments as our principal concern. Destroying the myth inside the business that we are more interested in earnings than in service is an objective of the highest priority. For until such myths are dead and buried wherever they may exist inside the Bell System, dramatic improvements in attitudes outside cannot be expected.

But where do we stand right now, and what are our prospects?

In his talk at the Pioneer General Assembly in Denver in September, Mr. deButts considered some of the more significant questions. As to criticism of service performance, he said we declined to take comfort in the fact that we were not the only targets of public impatience and consumer activists. Nor did we make excuses or compare the scope of our services with the very small percentage of error experienced.

"Instead we put our heads down and quietly went to work. The enormous programs of recent years and the strain they put on earnings are, I think, sufficient evidence of the sincerity of our commitment to bring service everywhere, provided we are permitted the wherewithal to accomplish it, to the level customers have every right to expect."

As to earnings, Mr. deButts recalled the pledges he had made in April at the annual meeting of share owners—that the Bell System would achieve a significant improvement, "not someday, not next year, but now in 1972."

"What has happened since? You may count the days since April 19. Not quite five months have passed. But in that space of time—despite a severe setback in California, despite the FCC's postponement of its decision in our protracted interstate rate case—earnings have risen to a level that convinces me that, with a little extra effort in the year's remaining months, we can meet the goal. It was on the basis of this conviction that last month I recommended—and our Board of Directors authorized—an increase in the dividend."

The Board Chairman spoke, too, about the renewed vigor of the Bell System's response to competition and to any "alterations in the structure of our industry that would in our opinion sap its strength to serve by undermining the basic principles that made it great. *We are, in short, beginning to stand up for what we believe.*"

Reviewing the five months that had elapsed since he took office, Mr. deButts added:

"During this period I have been spending as much of my time as I could spare—and some I couldn't—traveling among the Bell companies and talking with groups of telephone people. It has been an inspiring experience for me. For everywhere I've gone in the course of these travels I found the "message" I thought I was carrying with me waiting for me when I got there. That message has been conveyed to me — by telephone people themselves—in terms so consistent as to leave no doubt as to its reality: *this business is on the move again.*"

The evidence appears to be that the breach is being sealed. ☐

An Epoch in the Making

The transistor's impact in the past 25 years, with a look at the future.

By James T. Rogers

The transistor began its remarkable career with becoming modesty 25 years ago, on December 23, 1947, when John Bardeen, Walter Brattain and William Shockley demonstrated that a small semiconductor device could be made to amplify a speech signal about 20 times.

It was actually one of those events in the annals of discovery and invention that should have been ushered in by a clap of thunder or other appropriate accompaniment. But it seldom happens that way. It is unlikely, for example, that Thomas Edison could have imagined all that would issue from the glow of the slender carbon filament that would eventually light the world, or that James Watt before him could have seen himself helping to forge with steam an "industrial revolution."

The transistor is in that momentous line, that long and fruitful record of scientific and technological achievement that began with fire and the wheel, and that has materially expanded the scope of men's energies and resources.

But foresight being at best blurry, nobody had a clear view of the startling impact this small, rugged and versatile electronic device would have in every quarter of the globe. Now, with the revolution it wrought so evident, one can assess the economic, social and political effects. Moreover, using hindsight to sharpen foresight, one can speculate on where the transistor and the solid-state technology directly descended from it will take us in the next and perhaps crucial 25 years.

Before transistors, the technology of electronics was based on the vacuum tube, which had, in effect, made possible modern communications, including long distance telephony, radio, television, and a host of other applications. But the tube was chemically and mechanically fragile, used large amounts of power and developed a great deal of heat, thus making the cost of operating and maintaining electronic systems high. Indeed, the research and development effort that led to the transistor was set in motion because people in the Bell System were aware that the vacuum tube would not be reliable or economical enough to provide the high quality of telephone service that would be needed in the near future. The telephone system is therefore a good place to begin assessing the impact of the transistor.

From the viewpoint of the telephone user, the transistor (as a key component of undersea cables and communication satellites) has meant a great improvement in the quality of international calls and the speed with which they are put through. Similarly, transistors in long-distance transmission systems and in switching systems are a major factor in the ease and speed with which long distance calls can

be made. Another benefit to the telephone user, although he is usually aware of it indirectly, if at all, is that the transistor has made possible an enormous increase in the volume of calls that can be handled.

People in the Bell System have even more reason to know how much the reliability and versatility of the system have been extended by the transistor. The digital transmission systems T1 and T2 were made practical by the transistor. Long-distance transmission systems such as L5 and the latest ocean-cable system are transistorized, as are, most importantly, the electronic switching systems now used by all Bell companies. Electronic switching is, in itself, a revolutionary advance, involving not only the advantages of size, speed and reliability, but a whole new concept of communications services and functions, based on the unique characteristics of electronic technology. Also involved, of course, are the billions of dollars the Bell companies will be spending to integrate such systems into the network over the next 20 years.

The effect of the transistor is readily apparent when one compares modern solid state systems with vacuum-tube systems. For example, TD-2 microwave, which is the transmission workhorse of the nationwide telephone network, had a capacity of 2,400 circuits when it was based on vacuum tubes. Replacing most of the tubes with transistors and solid-state components helped—with other changes—to increase the number of circuits to 16,500.

The aerospace industry has also been profoundly affected by the transistor. When the device made its appearance, commercial airlines were in the DC-3 era and were already being plagued with delays resulting from the unreliability of the small amount of vacuum-tube electronic gear that the planes carried. Now an airliner carries 10 times as much electronic equipment as the DC-3 carried, with corresponding benefits to the passengers in safety of flight and reliability of service.

The aerospace industry; space exploration, satellites...

If the technology still depended on vacuum tubes, a good deal of the plane's interior space would be filled with the equipment and the unreliability factor would be far worse than it was 25 years ago. Passengers have also benefited from the transistor in another way: the computers that make reservations (a slow and frustrating experience for the passenger in pre-computer days) owe their speed and reliability to the transistor.

Smaller airplanes, if there were no transistors, would carry little more in the way of electronic equipment than a radio and a direction finder. Because of the transistor many smaller planes can operate with almost as much electronic gear as a commercial airliner carries, including distance-measuring equipment, weather radar and radar transponders.

In another branch of the aerospace industry, transistors are crucial in such important military weapons as intercontinental ballistic missiles and the systems erected to defend against missiles that might be directed at the U.S. Without transistors and solid state technology, much of what is now "payload" in a missile would be supplanted by the equipment needed for guidance and control. Moreover, the smaller missiles that are an important part of the United States arsenal would probably not have been developed. As for anti-ballistic-missile systems, the radar and computers that they depend on simply could not be built if they had to be made with vacuum tubes.

Without solid-state technology, most of the space exploration that has made headlines since Sputnik went aloft in 1957 would have been impossible. Perhaps means could have been devised to probe the atmosphere and regions near it by using vacuum-tube technology, but the equipment that took men to the moon and enabled them to communicate with the earth (and earth-dwellers to see them) would have been beyond reach, as would the space vehicles that have been employed by the United States and the U.S.S.R. to explore other planets of the solar system.

Satellites, which produce a host of political, economic and social consequences, would not exist without transistorized electronics. Communications satellites, in addition to their role in international telephony, have made it possible for television viewers to see events in distant lands as they are happening. Military reconnaissance satellites, which are said to provide pictures that show features on the ground as small as one foot in diameter, account for a large part of the progress that has been made in arms control over the past decade, since the satellites make it possible for a nation to verify whether its partners in arms-control agreements are adhering to the terms of those agreements.

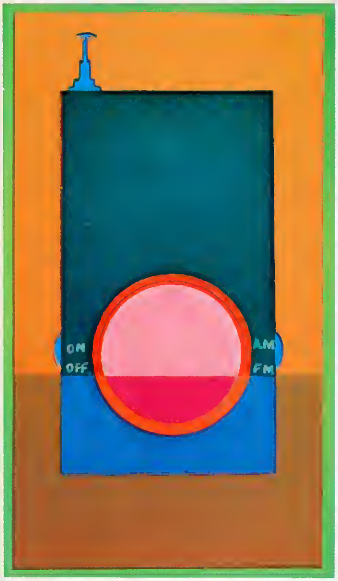
The Earth Resources Technology Satellite (ERTS I) recently launched by the U.S. opens the way for cartographers to make more accurate and informative maps; for geographers to analyze land-use patterns over broad areas and to study the interplay of climate, topography, plant life, animal life and human activity in a particular area; for geologists to find deposits of minerals and petroleum; for oceanographers to map the movements of ocean currents, marine organisms and water pollutants; for foresters and agriculturalists to determine what is growing in various areas, assess the health of the forest or crop and even estimate the size of harvests; for agronomists to determine the physical and chemical characteristics of soils; for zoologists and ecologists to keep track of the movements of such animals as the moose and the polar bear (provided that the investigator has first attached a transistorized transmitter to the animal); and for engineers planning such large construction projects as highways, airports and dams to obtain data on landforms, rock materials, soils, types of vegetation and conditions of drainage. Meteorological satellites enable weathermen to see when a storm is born and to follow it as it develops; the satellites are also yielding for the first time a broad picture of the earth's weather patterns. Navigation satellites provide vital positional information for ships and submarines.

This is not the place to recount in detail the far-reaching importance of the computer in contemporary affairs. The point to be made is that without transistors (a large computer uses more than 100,000 of them), the speed, versatility and reliability of computers would be far below the present levels—and the size and cost (if computers of comparable capability could even be built) would be many times that of today's machines. It seems reasonable to say that if computers still rested on the technology of the vacuum tube, the computer industry would be far smaller than it is today and the use of computers far less varied and consequential.

Let us turn from these large industrial vistas and consider what the transistor has meant on a more personal scale. The transistor radio is so familiar and so ubiquitous that its name is often shortened to "transistor." One sees it everywhere (and sometimes hears it in places where one would prefer quiet). Low-cost transistor radios have brought music and the spoken word to the most remote corners of the earth, bringing into touch with their times people who had been physically and intellectually isolated. From camel riders in the desert to farmers in rice fields to people who live in rain forests, the transistor radio has been a powerful source of education and entertainment.

In the nation's larger cities one now sees policemen, firemen, physicians and other emergency workers carrying transistor radios of pocket size—far smaller than any portable radio would be without transistors. The resulting increase in the speed of response to emergencies is considerable. In a similar way, transistorized paging devices enable people in all kinds of work and all kinds of places to remain in touch with their headquarters.

Computers; pacemakers; electronic organs, cameras...



The maintenance and improvement of human health has been greatly aided by the transistor and its descendants. A large number of instruments available to physicians and hospital staffs monitor vital signs and provide information on bodily functions. People with heart ailments are kept alive with solid-state pacemakers. Electrocardiograms can be sent by telephone to heart specialists far away from their patients. Transistors make possible hearing aids so small that one can be contained in a bow of a pair of eyeglasses or hidden behind the ear. People who have lost their vocal cords can speak through a transistorized artificial larynx.

Without transistors, the familiar camera with automatic exposure control either would not exist or would require a bulky package of electronic equipment. In music, an electronic organ with as much capability as the huge instruments once found in theaters can be made the size of a spinet and put in a living room because of the miniaturization that transistors make possible.

In sum, the transistor has proved to be one of the major inventions of the 20th century. Replacing and outpacing the electron tube, it has led the way to a vast extension of the scope of electronics, carrying the field beyond communications to computation, machine control and a large variety of automatic mechanisms, including a rising number of high-power applications. All of the low-power portable electronic equipment that one encounters now owes its existence to the transistor. So does the modern generation of computers, which has so extended the reach of human thought.

Indeed, the entire electronics industry has largely received its shape and direction from the transistor and the many solid-state devices that have resulted from the transistor, including microwave units, light-emitting devices and, above all, the burgeoning technology of integrated circuits. The scope of the transistor's effect is suggested by the fact that in 1971 the sales of all types of solid-state devices in the United States, Europe and Japan reached $2.5 billion. To put the matter another way, some 13.4 billion solid-state devices were sold in 1971, and nine billion of them were transistors. In the U.S. alone, the number of people employed in businesses concerned with solid-state technology is now in the millions.

What of the future? Hints of the surprises yet in store from the transistor and its myriad descendants are beginning to appear in newspapers, magazines and professional journals. For example, the National Aeronautics and Space Administration (NASA) recently published a catalogue of 1,892 inventions that have resulted from the space effort. Many of them rely on solid-state technology. They include a sight switch, built into the frame of a pair of eyeglasses, with which a patient lacking the use of his arms and legs can operate a wheelchair, turn the pages of a book or send a signal to a nurse—all merely by moving his eyes. Another invention is a powered, artificial hand. There is also a land-surveying system based on the laser which, in its semiconductor form, is a cousin to the light-emitting diode—a positive-negative junction device that is closely related to the transistor.

Lasers and light-emitting diodes make possible what is called optical communications, meaning electronic communications at the frequencies of infrared and visible light. If the technology can be perfected, the amount of bandwidth available for communication would be virtually limitless. Light-emitting diodes are used increasingly in calculators, medical equipment, computers and other electronic equipment, and can be expected in such devices as watches and telephones.

Solid-state diodes as a source of microwaves (radiation of wavelengths ranging from 30 centimeters to about three millimeters) appear likely to lead soon to a proliferating technology. It can be expected that they will supplant such expensive electron-tube sources as the klystron and, possibly, the magnetron in communications, navigation and industrial electronics. One can foresee that commercial organizations will use solid-state microwave sources on a large scale to transmit information and control industrial processes. The devices will certainly find extensive use in direct satellite-to-earth communication. They would make possible a greatly expanded use of automobile telephones and even radar in automobiles for such purposes as warning of obstacles, providng automatic headway control and triggering air bags in case of collision. Microwave systems are coming into service as burglar alarms and could be developed as fire alarms. Water, gas and electric companies are exploring the idea of reading meters by a system in which a truck with a microwave transmitter-receiver will interrogate a transponder on each house. Microwave systems could be used to keep track of buses, police cars and other vehicles whose location needs to be known.

Powered, artificial hands; radar in automobiles...

A few years ago, John R. Pierce, who was then executive director of research in communications sciences at Bell Telephone Laboratories (he recently retired, after 35 years service, and is now professor of electrical engineering at the California Institute of Technology), was asked by *The New York Times* to speculate on the future of communication and computation—the areas in which transistors and the solid-state technology that has flowed from them have had their most profound effects. Pierce expressed the view that the transistor and the solid-state art, digital computers, communications satellites, microwave communications and communication by laser are still in their infancy. Integrated circuits, he said, "promise much smaller computers, much smaller communication terminals, lower-cost Picturephone® service and access by sight, sound and even touch to all the complexities of objects and events thousands of miles away." He foresaw greatly increased reliance on radio waves and light waves guided through buried cables or tubes because of crowding of open-air radio-communication facilities. In a shortened version of his article, published in the *Bell Laboratories Record*, he painted the following prospect:

"I expect that within 25 years you won't have to wait for a broadcast if you want to see your favorite musical or opera. Hundreds of mass communication channels will come into your home. If what you want is available on any of those channels during any part of the day, you will be able to make a videotape or other recording and view the program at your leisure. In homes and offices people will have an ever-ready reference service, operated perhaps by newspapers or publishers of encyclopedias. Touching a few buttons on the Picturephone set will bring them an index of what information they are interested in, whether it is air travel, skiing weather, sports scores, or hotel reservations. They will be able, in effect, to turn pages by touching a few more buttons and to trace information—in libraries and other sources all over the world.

"When people want to solve problems, they can use the computers via telephone or Picturephone, renting service from any of a number of concerns. The computer will teach the user how to use it through a sort of question-and-answer method, offering options and suggestions at every point. In fact, it is now clear that one can learn many things other than programming computers in this way.

"Computer-aided instruction is today an experimental uneconomical reality. Twenty-five years from now, children will go to schools for group activities, but they won't have to go to schools in order to learn things. Clever computer programs will teach them to read or sing or do arithmetic or to play the piano or spell, or any of a host of other activities, more effectively than most teachers do now. Lectures will stimulate students, books will enlighten and computer-accessible information stores will make research a resource and a habit.

"Along with this, there can be a mechanization of shopping and transactions of all sorts, and computerization may make delivery of goods at set times a reality.

"The patient who calls the doctor will speak to him not only with his own voice, but with his body as well, so that a physical visit will not be necessary for many simple diagnostic techniques."

A committee of experts assembled by the National Academy of Engineering to study urban communications foresaw the future in much the same light. In its recent report, *Communications Technology for Urban Improvement,* the committee envisioned two-way cable links whereby a person in his home or office could choose from a large number of television programs; obtain copies of printed material; order goods; participate in polls; have heat and lights turned on or off when he was absent; obtain his utility bills, which would have been read automatically, and go away with the knowledge that the system would automatically warn police or firemen of burglary or fire on the premises.

Navigational aids; fire alarms; help for the cities...

Another prospect foreseen by the committee was that a subscriber could have a computer terminal in his home or office, obtaining by means of the link information about entertainment schedules, the state of the public transportation system, airline flight schedules, and so on. In the same vein, the committee said, it should be possible to develop a computerized system that would keep track of buses and display at every stop the time the next bus would arrive (and also the routes followed by all the buses serving the stop). At a parking lot adjacent to a mass-transit terminal the motorist would be aided by a system of sensors linked to a computer, so that on a display screen he would be guided to an empty parking place near the transit line he wanted to ride. The committee concluded:

"Our cities have many problems in urgent need of solutions. City governments have a requirement for closer communications with their citizens and readier response to citizen needs. City schools are less than satisfactory in providing quality education to the nation's youth. Medical care is inadequate for the cities' poorer and older citizens. Individualized transportation is clogging the streets and polluting the air. Public transportation is often inefficient and unattractive to its users. Law enforcement agencies have difficulty in coping with a growing crime rate.

"The Committee believes that modern communications technology, thoughtfully applied, can help in relieving many of these problems and in upgrading the level of city life."

Back in 1843, several years before Alexander Graham Bell was born, a United States Patent Commissioner named Henry L. Ellsworth looked around at all the evidence of American ingenuity, at the profuse flowering of invention that he was called upon to cope with, and he said:

"The advancement of the arts taxes our credulity and seems to presage the arrival of that period when human improvement must end."

Since that forecast, discovery and invention have accelerated, and epochs have been created out of them. It is obvious that the transistor has given birth to another, and for all its variety and accomplishment to date, that epoch is probably just starting.

James T. Rogers is a member of the board of editors of Scientific American. *Following his graduation from Harvard College in 1942, he spent four years in the Army and then began work as a newspaperman. Until he took up his present work in 1963 he was successively a reporter, a member of the Washington bureau of the Gannett newspapers and a writer of the "Review of the Week" at* The New York Times.

Fast Freight

Computers and telephones link up in a new 'Servocentre' network to keep it clicking along.

Montreal is a sprawling city of nearly three million people and is referred to by most inhabitants as "the island." The term is essentially correct in that the waters of the St. Lawrence River virtually surround the city. It is a meticulously clean, modern town and can rightly be called the economic and industrial capital of Canada, most major Canadian firms having their headquarters located in Montreal. One of the most prominent is Canadian National Railways, a $1.2 billion per year enterprise.

Canadian National owns and operates more than 110,000 freight cars, 1,800 passenger cars and 2,100 locomotives over some 36,000 miles of track that crisscrosses Canada from coast to coast and reaches into the United States. In 1971, Canadian National hauled more than 109 million tons of freight and carried 13 million passengers over 125 million car miles.

Obviously, to operate such a vast

extensive rail system, one key to success lies in communications, modern communications designed to meet the needs of today's passenger and freight customer. For Canadian National the key to modern communications is innovative use of man's best friends—the digital computer and the telephone.

Enter the telephone

In the early days of railroading it was necessary for the railway to maintain a representative in virtually every community served by its lines. The train was infinitely preferable to the horse and wagon for travel and served, too, as a fast means of communications, second only to the telegraph. But the only way the railroad could adequately communicate with its customers was by maintaining a rail agent in each community.

These representatives functioned to a large extent as middlemen, using telegraph keys to contact stations further down the lines to order cars, collect information and the like. The agents did, in fact, provide some degree of personal contact between the company and the customer but only insofar as the customer could come to them. Their duties kept them pretty close to the railroad office.

With the advent of increased efficiency and flexibility in personal transportation — the invention and growing use of the automobile—it became less necessary for the railroads to keep an agent in every town. Major service forces could now be more centrally located in larger communities. The invention and immediate widespread development of the telephone tended to accelerate this process of change even faster. More and more businesses found it practical to telephone the larger centers for information and service, by-passing the middleman or local agent, thus leaving him with more free time and less work.

Still it was important—to the railroad—that each community on the line have some method of obtaining fast, accurate information without having to drive a great distance or pay telephone toll charges.

Canadian National in the 1950s created master agencies which were composed of three or more local stations. A customer could call any of the stations in a master group and receive information which was made common to all stations in the group. For the railroad this arrangement eliminated the time-consuming and costly task of relaying requests for information from one station to another until the primary source was reached. Each master group had access into regional headquarters.

But even this streamlined method of operation was made obsolete by the computer with its awesome potential for data dissemination. Vital records can now be programmed, stored and retrieved in seconds; train information on car loads, express and passenger service can be coded and transmitted to distant points in virtually no time at all. However, most of the computer capability was channeled into staff or administrative functions, and although the computer made the railroad run more efficiently, the customer did not feel its impact directly.

Then, two years ago, Canadian National took the process of innovation and change a step further by inaugurating the Servocentre concept, a subtle blend of computer technology and modern telecommunications.

Servocentre defined

Basically, the Servocentre is a further sophistication refined from the master agency concept. It is a centralized point from which customers in the Servocentre's area can get instant information on a wide variety of the railroad's services.

The Servocentre in St. Lambert, outside Montreal, for example, serves some 15 points from as far north as Laurier in Canada to Massena in New York State, one of Canadian National's many points of entry into the United States, a radius of perhaps 150 miles. The St. Lambert Servocentre is tied into the main computer in Montreal which has up-to-date information on every aspect of the railroad's services. The computer, an IBM 7070, is programmed with a system called TRACS (Traffic Reporting and Control Systems). Information is fed into the computer six times a day, seven days a week.

How it all works

What happens, then, is that a customer calls the Servocentre for information on his shipment of materials. The Canadian National staff on duty uses a teletype terminal to access the computer in Montreal and gets an almost instant feedback on the location and status of the car in question. The information is then relayed to the customer over the telephone.

Customers can reach the nearest Servocentre in one of three ways: toll-free (to the customer) Zenith numbers, foreign exchange lines and local lines if their place of business or residence is within the local calling area. In any case, Canadian National pays the telephone bill, not the customer. The telephone service is, of course, provided by Bell of Canada. The Canadian Zenith service is identical to the common Enterprise numbers in the United States. (Enterprise service is directed at the smaller business customer who has no need for the more extensive WATS service. In effect, Enterprise service gives the businessman WATS capability but on a smaller scale then the typical WATS zone. An Enterprise zone is usually the same as the size of the telephone directory in the businessman's area. And, too, calls made on Enterprise numbers are operator handled rather than dialed directly. For Canadian National and its Servocentres, Zenith service is preferable to WATS service.) Canadian National customers in the United States using the railroad's services through its Central Vermont and Grand Trunk subsidiaries would use Enterprise numbers to reach the St. Albans, Vt. and Berlin, N. H. Servocentres.

Trackside scanners

At this time, Canadian National has 11 Servocentres in operation in the St. Lawrence region (most of Quebec province) and 59 in service across Canada. Final plans call for 100 Servocentres to be in operation by the end of 1973.

With such a system, it is unreasonable to assume that local businesses would or should work through a local agent when they can telephone free-of-charge a center which has direct access to a central computer constantly monitoring the operation of the entire railway across the nation.

Canadian National has been moving towards this information system for some time. But the building blocks have not been railroad tie and steel rail. Rather, the most important elements have been the telephone, the data processing computer and the punched card.

To examine the system in microcosm, consider what happens at a single Servocentre during a day of operation. Every time a train leaves a terminal, is received in one, or is made up in one, a punched card for every freight car and locomotive in the train is run through the data machines. Similarly, every time a car is ordered, switched, placed on a siding, loaded, unloaded, released, or sent for service a card run through the machine brings the information up to date.

Cards not only record what is happening to each car—whether it is loaded or empty, to whom it is going, what is to be its destination —but they also update the central computer every four hours.

In the St. Lawrence region, a further refinement on the system is the use of trackside scanners. These electronic devices, spotted at strategic locations, read information off color-coded plates attached to the side of every car as a train passes by. They report what they "see" to the computer instantly. Plans call for trackside scanners to be used all across Canada.

Undeniably, the Servocentre concept places a strong emphasis on hardware and therein lies a problem—a possible loss of personal contact with customers. The ubiquitous computer can do many things, but personal contact with people is not one of them. As a result, Canadian National has attached to each Servocentre a number of traveling representatives whose job it is to make personal visits with customers to deal with specific or complex problems on a personal basis. They will be able to do this much more effectively than the traditional railway agent since this will be their main, and not a subsidiary, function.

Long-range pluses

Because Canadian National's two main services are carload freight and express (freight of less than carload size), it has been necessary in some communities to establish contact with local businessmen and have them provide portions of their places of business as depots for express parcels. The idea is not new and has been employed elsewhere with great success. The reason is that local businesses are usually more centrally located than railway offices and are open longer.

There are also some long-range improvements that Canadian National hopes to achieve from the Servocentre concept. First, through the use of Zenith telephone service, it will be possible to provide many small communities, which now have limited or no railway representation, with a level of service information equal to that provided for larger urban centers.

Second, when the system is fully implemented the railway will be able to pinpoint instantly on any of its lines in Canada or the United States the exact location and status of any of its cars.

Last, Canadian National expects eventually to gain the capacity to calculate quickly the individual schedules for the movement of individual railroad cars from originating point to destination—siding-to-siding service.

Interest spreading

It would appear, at this point in time, that the telephone company return from the project is relatively small. This is essentially true. The Canadian National account with Bell of Canada is not a large one, as such accounts go. Telephone company annual revenue from toll equipment amounts to approximately $126,000 while long distance service (Zenith and foreign exchange lines) accounts for something over $26,000 per year. For interoffice trunking, Canadian National uses its own dedicated plant and transmission systems.

What is important about the system, from the telephone company perspective, however, is the concept itself. It is an innovative, modern approach to modern problems —and it is working. Already two American railroads, Southern Pacific in California and Union Pacific in Chicago have expressed interest in how the system would benefit their operation. In the case of American railroads, the Bell System would play a far greater role in providing equipment and service for railway telecommunications. ☐

The Human Touch

The marks they left upon the personality of the Bell System were not the least of the accomplishments of Alexander Graham Bell and Thomas A. Watson. The two men were notably different from each other, and from what inventors are generally expected to be, but they were blessed in "the happy conjuncture of their complementarities."

by Henry M. Boettinger

The beginning of any state, institution, business, or dynasty is marked by an adventure. Certain persons, to whom later ages grant the accolade of "great," alter the momentum of the past and channel existing forces in new directions. What we call the "progress of humanity" is the settlement of those new regions of thought and aspirations which are first discerned, explored and mapped by such pioneers.

The Bell System is no exception, but its adventure began with an unlikely collaboration of two men, of widely disparate personalities. Neither met our stereotyped view of the classic inventor, and the subsequent traditions and "personality" of the Bell System have been influenced far more than we realize by their characters and vision. Those who deal with Bell System people today, such as academic or other professional consultants, are invariably struck by the *social* nature of our organization, which is one of unexpected informality. People seem to know one another regardless of geographical distance, use telephone calls as their prime way to establish facts or erase areas of personal ignorance, and have both a genuine respect for the superior knowledge of a colleague and an expectation that he will help you with a problem that can use his knowledge. Those of us reared in our "inside" culture take all this for granted, but it is an aspect of organization far from universal—perhaps unique—which I believe has its roots in that fortuitous alliance of Alexander Graham Bell and Thomas A. Watson. Both were vivid personalities, rich in versatility, talent and audacity. This year marks the 125th anniversary of Bell's birth, and the 50th of his death. It is certainly fitting, and perhaps instructive, to return in our imaginations to that period of high adventure, and extract from their triumph over vicissitudes, lessons and inspiration for the conduct of our own lives.

Seldom in history have two men, of extreme differences in origin, background and temperament, suc-

The United States of America
Alexander Graham Bell, of Salem, Massachusetts
Commissioner of Patents
Letters Patent
Improvement in Telegraphy
Whereas
LETTERS PATENT
Alexander Graham Bell, his
In testimony whereof
Patent Office
Washington

cessfully altered the shape of society's subsequent development by the happy conjuncture of their complementarities.

A London specialist had given young Alexander only six months to live.

Let us make a quick reconnaissance of their early lives, that nursery of talents where seemingly random events influence the mature growth of personality's impact.

Alexander Graham Bell was born in Edinburgh, Scotland, March 3, 1847. His grandfather, originally a shoemaker, became a Shakespearean actor, and the register of his marriage lists him as a comedian. The moral tone of Scotland—expressed in his prospective in-laws—forced him to leave the stage and he set up as a "reader" of Shakespeare on the lecture platform, and as a teacher who undertook the "correction of defective utterance" in private clients. This histrionic talent was transmitted undiminished to his son and grandson. Melville Bell, Alexander's father, continued the work, presenting entire plays of Shakespeare, taking every part himself. He invented a system of Visible Speech, by which any sound from any language could be written down and reproduced by those trained in ten symbols of voice production. He employed young Alexander in public demonstrations of the method, and George Bernard Shaw later used Melville Bell for his model of Professor Higgins in *Pygmalion*, known to us also in its musical form, *My Fair Lady*. Melville had also spent four years in Newfoundland for his health—from 18 to 22—and this trip inspired his later emigration to North America. Alexander's formal schooling ended at 14, but he continued his self-education throughout his life, beginning with his grandfather in London. His mother, a gifted painter and musician, also instructed him, and for a time Alex's skill at the piano inclined him toward the concert stage. While teaching elocution, Alexander was invited, at the age of 21, to adapt Visible Speech to the education of the deaf. He maintained intense interest in this subject throughout his entire life and credited it with the invention of the telephone.

After Alexander's two brothers died of tuberculosis, his father, in a desperate move to save his only son, decided in 1870 to leave Britain's harsh climate, gave up his successful professional practice, and settled in Ontario, Canada. A London specialist predicted that Alex had six months to live. But, in April 1871, he substituted for his ill father in a course of lectures for the deaf at Boston, where he set up a school of vocal physiology, and became a professor at Boston University in 1873. During this period several separate strands of his life converged. He took as a pupil George Sanders, whose father later placed his entire fortune and credit to finance the telephone. He met Mabel Hubbard, a deaf young lady who became his wife, and whose father was the first telephone association president. He experimented with electrical tuning forks to make a multiple telegraph, and searched for ways to make actual speech visible to deaf persons. He had no training at all in electricity, but when he admitted this to Joseph Henry, America's foremost physicist and head of the Smithsonian, Henry simply told him, "Get it."

Until his death, Bell always wanted to observe and find out things for himself, never satisfied to accept the writings or experiments of others. As one reads the chronicles of these years, his hectic life of teaching by day and experimenting by night seem to leave no time for sleep. In fact, he often imperiled his health when hot on the trail of an idea–and few have ever had so many ideas in so many fields for so long a time. But Bell had almost no mechanical aptitude for constructing anything. Blessed with a bold, original mind, acutely sensitive in hearing and music, an orator of immense power, a gifted writer and clever at sketching, able to teach any subject in which he was interested, he became "all-thumbs" when handling even simple tools. In that Age of Invention, peopled by first-class mechanics, this should have been a crippling disability. This lack Watson filled for him. Like two comets, their paths converged, their skills intertwined, and after a yeasty period of mutual creativity, they again went separate ways.

When he and
Bell were
baffled by
technical
problem,
Watson
consulted
piritualists
in Boston.

Watson was born on January 18, 1854, at a livery stable in Salem, Massachusetts, which his father managed. Like Bell, his formal schooling ended at 14, when he worked as a clerk in a crockery store. Desiring to improve himself, he took a commercial course in bookkeeping and the rudiments of law. But his eyes became weak from the study, and he became an apprentice carpenter. His muscles were inadequate to the heavy beams and 10-hour days, so he tried for a lighter trade. In 1872, he landed a job at the machine shop of Charles Williams in Boston. The dingy third floor and attic shop made the novelties of electrical apparatus for both telegraphs and models which embodied inventors' notions. Watson became a journeyman in two years, with a reputation for clever approaches to repetitive production by using tools developed from close analysis of work movements of the sort later made famous by industrial engineers. He also developed an interest in Spiritualism. In his later association with Bell, when both were baffled by a technical problem, he once consulted mediums in Boston for the breakthrough that eluded them. He shared with Bell three attributes: extremely developed powers of analytical observation, an audacity in trying unusual solutions and an intense interest in developing his skill in declaiming and elocution. While Bell had his collateral interests in education of the deaf as a counterpoise to electricity, Watson was continually fascinated by steam engines. Thus one saw electricity as the means to extend man's senses, the other as one form of the powers of nature to be harnessed to man's use. Both views were essential to the technology of telephony.

They met, characteristically, in 1874, by a breach of existing rules. Irritated at his inability to communicate his ideas of the harmonic telegraph to the machine shop front office, Bell crashed through the door which led to the shop itself, went directly to Watson, and told him what he wanted done. They worked together constantly after that, often sharing the same lodgings so they could labor all night. Bell also shared his visions with Watson for his idea of *voice* telegraphy. On June 2, 1875, Watson tried to get one of the unsuccessful harmonic telegraph transmitters going after an adjustment screw had become too tight. This fancy name describes something quite plain: a piece of magnetized steel reed fixed at one end over an electromagnet. The idea was for receiving reeds "tuned" to different pitches to respond only to transmitters "tuned" to an identical pitch. If this could be done, one could send several telegraph messages over the same wire, each sorted out by their specific pitch. This, of course, is the principle used in all carrier circuits, radio and television, but in 1875, holders of such an idea were considered somewhat abnormal.

As Watson plucked the reed, he suddenly heard a great shout from Bell, who rushed from the attic to see what was going on. His superbly sensitive ear had discerned the *sound* of the plucked maladjusted reed at his end as he watched the receiving reed before him only for *movement*. "Chance favors the prepared mind," wrote Pasteur, and here his insight is confirmed. Without Bell's knowledge of sound, his uncanny hearing, and the unformed ideas struggling in his consciousness, the event would have been ignored. Also, communication *is* a two-person phenomenon, and here were two persons, eager and concentrated on a single task, both alert for the least glimmer of encouragement from Nature. That night, Bell sketched out his design for the "Gallows-Frame" telephone, and the next day Watson made two of them as soon as the machine shop opened. They worked, but feebly. Best, when Bell's powerful, resonant voice set the little membrane into vibration. After some improvements, the next months were consumed by Bell's recovery from overwork and preparing the specifications for his patent application. He wrote these entirely by himself, and they were such a monument of clarity and originality that after filing the patent on February 14, 1876, it was allowed on his birthday, March 3, and issued on March 7, 1876. Three days later, the first complete sentence was transmitted by telephone—characteristically, an emergency call. Watson had made a new kind of transmitter where a wire, under control of the membrane agitated by the voice, dipped into dilute sulfuric acid, so that as the wire rose and fell in the acid, variable currents would flow to the receiver. Bell, ready to try it out after Watson had departed for the receiver, mechanically inept as always, spilled battery acid over his clothes and shouted "Mr. Watson, come here, I want you!" Watson heard him and complied. Bell remained oblivious to the damage done to his suit, and broke into one of the war dances learned from the Canadian natives near his home, and which were to signal his triumphs to a succession of irate landladies in the years ahead.

Throughout their association, Watson regarded Bell as an educated, refined and noble person, and Bell expressed his gratitude by taking over what we would call today, Watson's "management development." He gave him books and reading lists, forced him to re-study algebra, made him begin foreign languages and read classical literature, and instructed him in the arts of speaking and elocution. Bell also taught the table manners of a gentleman to his colleague as they shared Watson's meager lunches from paper bags.

The period following Bell's patent is crammed with bizarre and improbable coincidences which even an amateur novelist would not dare include in fiction.

For the United States Centennial Exposition in Philadelphia, Watson hurriedly constructed two telephones which were placed behind a stairwell in the Education building, because the application was too late for the scientific exhibits. Few came to see it until one Sunday on a special tour, the Emperor of Brazil, accompanied by Lord Kelvin, the foremost scientist in the world, caught sight of Bell and recognized him as the teacher of the deaf he had met in Boston. The imperial party was at the last exhibit of the day, but the Emperor suggested that the judges see Bell's. They were all astonished as the words of Hamlet's soliloquy, "To be or not to be . . . ," were transmitted and responded to, line by line. Bell left for a Boston lecture that night, but his fiancee's cousin moved the sets to the main building where they caused great excitement in the remaining weeks of the Exposition—so much so that firemen were called on one occasion. Lord Kelvin became an evangelist for Bell in England, which led to interesting developments.

One of the coincidences which plagued Bell and Watson for years was the filing of a patent *caveat* by Elisha Gray, the leading electrical mind in America, a few hours after Bell filed his patent application on February 14, 1876.

The rapid development of the telephone can be seen in a few numbers: In May 1877 there were six telephones in the world; in November, 3,000 were producing revenues. By 1881, there were 133,000. Such development created counterforces. Over six hundred patent suits were filed against Bell, and five of them were decided by the Supreme Court. He was sustained in every case. Two things helped: Bell was probably the most impressive witness ever to take the stand. His powers of articulation and memory, expressed by an elocutionist's voice and courtly manner demolished confidence in his opponents' cases; and his original specifications were so comprehensive and expressed in such clear

*His invention had clearly worked,
and Bell broke into
one of the war dances
he had learned in Canada.*

English that they avoided all efforts to entangle them in the nets and pedantries of rival lawyers.

The long, nocturnal sessions with Watson, and notes made on any papers at hand—including a prescription blank from a medical friend—carried an awesome credibility.

A few months after the patent, hard pressed for cash, Bell's group offered their patents to Western Union for $100,000. It was refused. Even Watson took two weeks to decide to give Bell half his time for a ten per cent interest in the patents. But by the winter of 1877, Western Union mounted an attack on the Bell group with the newly filed patents of Gray, Edison, and Dolbear, setting up a rival telephone system. Bell sued. In the face of the evidence, Western Union's counsel advised settlement. As in so many other events in our history, the attack was a disguised blessing. If the mammoth national enterprise of Western Union thought Bell had something worth fighting for, then it must be a good thing! Bell and Watson continued to serve as witnesses in litigation long after they had gone on to other interests, and all of us who follow their trail owe them an enormous debt.

As the telephone developed, Bell and Watson's paths diverged, both leaving active involvement to pursue other interests after the successful launch. Before turning to their later, colorful lives, let's look at some of their characteristics which set some of our traditions.

Watson epitomized the audacious man of action, turning visions into reality with tactical genius. Bell was the visionary, who constantly thought in long-term, strategic concepts which would aid mankind's progress by using nature's secrets to rectify evils or allow society to make new advances. Both were *results*-oriented, not *process*-oriented. Problems were seen almost as antagonists to wrestle with, and they grabbed anything in sight, improvising as they fought their way through each day's challenges and disappointments. Their boldness and industry still astonish. They used the relaxed interconnection policy of the telegraph companies to make the riskiest demonstrations to large audiences. In 1877 they made a long distance call to a public hall in New York. Watson in Boston, huddled under a telephone booth made of blankets and barrel hoops (because of the landlady's complaints) singing his favorite song, "Do Not Trust Him, Gentle Lady," playing trombone solos, and reciting poetry in answer to Bell's standard signal from the platform, "Ahoy, Watson!," was typical. They embodied public relations genius, and it affected one of the great business decisions we now take for granted.

Bell wished to get married, but was in poverty. Mrs. Hubbard suggested a way out: sell the telephones which were now becoming popular for the cash which would allow him to support a wife. This was contrary to Bell's vision, but he hesitated in temptation. His skill in lecture demonstrations tapped a new demand, and the income from his performances, at fifty cents a head, allowed him to get married and retain ownership of the instruments. Watson then began to build telephones for licensing to others.

He travelled widely around the country setting up agencies, and solving technical problems of signalling and transmission as they arose. He received 60 patents in an incredibly short time, all developed by chasing demand wherever it surfaced. Meanwhile, Bell married Mabel Hubbard and they went to an England prepared by the praise of Lord Kelvin. The visit was essentially a great success, and the combination of Bell's forensic skills and his public relations talent made him a celebrity in all areas of life, from science to the music halls. Kate Field, a woman journalist, reported that she had placed over 20 articles on the telephone in leading periodicals, had inspired 50 more, and felt the United Kingdom was now primed for a "telephone display" to be held for the press just before Parliament opened.

At the meeting of the British Association for the Advancement of Science at Plymouth, Lord Kelvin was selected to make the first public telephonic utterance in Britain. With pencils poised, the cream of English savants waited to record the great man's remarks for history. He took the instrument from Bell, and shouted, "Hey, diddle, diddle—the cat and the fiddle—follow that up!" Kelvin beamed as he reported the reply to his audience, "There he goes, he says the cow jumped over the moon!" During the thunderous applause he told Bell that the actual transmission from the other end was "Would you please repeat that message?" Evidently, British public relations flair was not confined to Scotsmen. Success followed success as enthusiasm grew.

All this led to an invitation from Queen Victoria to demonstrate the wonder at her summer house. Bell obliged and made our first marketing error. Her Majesty was so delighted that next day she offered to buy the demonstration phones and wire. Bell did not think Watson's handwork sufficiently regal, so he arranged for two sets to be made by a jeweler from precious ivory. The process took so long that the Queen had lost interest by the time they were ready.

While Watson was interviewing Theodore Vail for the position of General Manager (which he accepted at $2,500 a year, plus $1,000 if his work were satisfactory), Bell wrote a remarkable circular letter in London to interest promoters, where he sketched all of the features of the modern, worldwide telephone system — central offices, underground and overhead cables, toll offices, long lines, testing, prohibitions against resale, public telephones, inventory controls, billing, marketing possibilities, and publicity. It is an inspired document, and some of its telepathy was on its way to Watson in America. Unhappily, in England, the telephone was considered a form of telegraphy, which was a nationalized service, because telegraphy had earlier been considered a form of the mail service, which could obviously only be a Crown monopoly. We in the United States were more fortunate.

Watson was as mobile as a bird, ready, willing, and able to put a telephone *anywhere*, *anytime*, for *any* purpose — and able to make them in any shape or form for the job. He wrote that in the early days, every instrument was different because he learned something new on each request and had to invent his way out of difficulties! It was this kind of uproarious creativity that required the services of Vail and the

Western Electric. Watson placed phones in damp mines, and thus had to devise insulated wire. On one occasion he was asked to help with the rebuilding of Boston Harbor. Divers could not communicate on floating boards the accurate location of repair work. Could telephones help? Watson had only one answer—of course! After he quickly built two "flat" telephones and placed them inside the large brass helmet, the diver went down, but could not make them operate. Watson reacted by immediately putting on the diver's suit, had himself lowered to the bottom, and found that even he could not make them work! He deduced the trouble in the ambient noise produced by the hissing air valve. While pondering this at the bottom of the harbor, he slipped and fell flat on his face, and in the prone position, the telephones worked perfectly! Arriving at the surface, he merely instructed the divers to make a deep bow when they wanted to talk. As he said later, if he had known how to dive, he would not have solved that problem, just as Alexander Bell's *lack* of electrical knowledge and eagerness to learn for himself allowed him to explore routes more expert men shunned, and find his invention on one of those odd paths.

No matter how tossed about they were by the hurricanes of activities, both Bell and Watson continually struck out on new paths. Their actions were completely foreign to those trapped by the *Territorial Imperative* where respect for the boundaries of academic disciplines prevents men of talent from excursions to new fields. They embraced, instead, what a friend of mine has termed the *Psychological Imperative*, which impels one toward *expansion* of interests in order to use talents developed in one area as the explorer's kit for new journeys of the mind beyond existing frontiers. This is what it means to be a pioneer, and is the only true Fountain of Youth. Watson and Bell never lost the child-like sense of wonder and the zest for intellectual adventure. Watson, characteristically, titled his charming autobiography *Exploring Life*—and it symbolizes the lives of both. They served others in multifarious ways, but not as philanthropists. All of their accomplishments which benefitted their fellow human beings—and we will consider them shortly—grew from their inner drive toward personal development and the performance of virtuoso talents.

Bell's and Watson's interests, achievements, and honors are so numerous that reading a mere list of them is fatiguing. It is even more remarkable when one knows that they were constantly under attack by persons, high and low, whose motivations were founded in greed, jealousy or hostility at their success. Yet, they never lowered their high standards of gentlemanly behavior in meeting unfair assaults on their characters and work.

In 1885, a suit was filed in Tennessee against Bell by the Pan-Electric Company whose officials claimed that Bell had secured his patents by fraud and collusion with Patent Office personnel. The Attorney General of the United States, who also happened to be a major stockholder of Pan-Electric, instituted additional charges against Bell in the name of the United States Government. The suit produced a scandal which rocked the highest areas of government, precipitated a Congressional investigation, triggered an editorial war between Pulitzer and *The New York Times*, rose to the Supreme Court, and resulted in complete victory for Bell in 1888.

Throughout this uproar, which would have demolished lesser men, the constructive activity of Bell and Watson continued undiminished, and was sustained to the end of their lives. Consider their range of output after both left the telephone business and turned over its development to organizers and managers. First, here are some of Bell's:

He invented the photophone, which used selenium, an early solid-state material, to transmit speech on light beams. This led to erroneous rumors that he had transmitted *pictures*, and immediately on the false report, several inventors claimed that they had developed video transmission earlier! In 1881, before X-rays, Bell hurriedly devised a surgical probe to help physicians find the bullet which killed President Garfield. Heidelberg University later gave Bell an honorary M.D. degree for the device. Napoleon I had established the Volta Prize for electrical discovery. Bell was the second recipient of the prize and used the money to establish the Volta Laboratory in Washington for research. There, he developed the *flat* phonograph record, because he wanted to be able to send speech through the mail. With the proceeds of that patent, he set up the Volta Bureau for "increase and diffusion of knowledge relating to the deaf." His studies there caused him to mount an attack on the exclusive use of sign language for educating the deaf—because he was convinced that it made or kept them mute—and published a controversial paper, *Memoir on the Formation of a Deaf Variety of the Human Race*, which subjected him to great abuse, because he was represented as in favor of prohibiting marriage of deaf partners. A Royal Commission in Britain, and Bell's most powerful critic in the United States, both agreed with his solution of *oral* training after they had heard his evidence. Bell placed all of the statistical resources of his Bureau at the disposal of his critics and said he would abide with their conclusions after scientific examination of the factual data.

He encouraged Glenn Curtis, the engine builder, and extended help to the Wright Brothers. Bell's airplane made the first *public* flight in 1908. He defended Langley and the Wrights against their detractors and championed the cause of aeronautical pioneers at the risk of his reputation. The fastest boat in the world, 71 mph, was a hydrofoil built to his personal design. He established the authoritative magazine, *Science*, and persuaded the *National Geographic* magazine to include pictures for the first time, and subsidized its deficit for ten years. He did research on: sheep breeding, use of radium in cancer treatment, rockets and gunpowder for propulsion, remedies for neuralgia, the light of fireflies, and why cats always land on their feet. He invented the aileron and pontoons for airplanes, and developed a cure for lung-strongyle in sheep. Through it all, he continued his Shakespeare readings, amateur theatricals, and piano playing, and travelled widely, including a trium-

At 56, Watson went to England and joined a touring repertory company as a student actor.

phant trip around the world. At the time of his death, on August 2, 1922, his diaries alone filled twenty-five bound volumes.

After 1881, Watson also left the telephone business, as he put it, "in better hands," and went to Europe to restore his health after his herculean labors. He was 27. Learning German, French, and Italian, he read through a good-sized library, pursued lessons in music, painting and fencing, and discovered an abiding interest in geology while in Rome. On his return, he married and began farming. The marriage was extremely successful, the farming was not. He set up a machine shop at the farm and began work on a rotary steam engine. This failed, but he built reciprocating engines for others that were so elegant that orders poured in. He added more men, and developed a cost accounting "card method" which comprehends all the features now used in advanced computer systems. The business exploded to gigantic proportions and became the Fore River Ship and Engine Company which employed twenty thousand people in the First World War.

Watson built the first destroyers for the Navy, three battleships, the Cape Hatteras lightship, and a seven-masted-schooner, the largest sailing ship ever launched in America. The first kindergarten in Massachusetts was started by Watson for his own children, and later became the first child day-care center for workmen in his plants. He served as school board chairman, designed school buildings which were widely copied and set up a 'People's Institute' for adult education. Watson promoted and organized the first municipally owned electric lighting plant in his state, and after experience as its general manager, abandoned and thereafter opposed what he called "practical socialism" because he felt that before it could be successful, "the forces of evolution must work an age or two longer on the spirit of man." During this period, poetry and geology—which he studied at M.I.T.—sustained him. There is a genus of fossils which bear his name as 'Watsonella.' Leaving the shipyard after a reorganization, he became interested in gold mining and spent a summer in Alaska. He credited his geology with saving his fortune and became an expert on the various methods of fraud used to trap unwary investors.

Watson then seriously pursued art, music and literature, touring all over Europe with his family in collective devotion to cultural studies.

In 1910, aged 56, he went to England and joined a touring reportory company as a student actor. He remembered that year as the most delightful experience of his life. Living in seedy theatrical boarding houses, playing in crowd scenes and walk-on parts in an incredible range of plays, from most of Shakespeare to modern operettas, he developed a comic talent and loved it so that he couldn't bear to stop at the end of the season. So, he and some of the younger unemployed actors formed a company to present performances at summer resorts. When they could not get the rights for enough plays, Watson sat down and wrote three. Their titles are interesting: *The Tale of Two Cities*, *Oliver Twist*, and *Nicholas Nickleby*. He took many of the parts himself and said that his choice of material was influenced by the interest in Dickens' Centennial. To add dramatic impact, he had his daughter come over from Radcliffe to play the piano for background music!

At the end of the tour, the manager bade him farewell with the line, "Don't lose your eternal youth, Mr. Watson!" He never did. Later, he said that had he been younger, this was the profession he would have chosen. After geological trips to Egypt and Sicily, Watson used his new theatrical skill to do readings from Shakespeare in New England. How curious it is that he converged to the same point as Bell's forebears. But his most popular oratorical piece was first given to the Telephone Pioneers at their General Assembly in Chicago in 1913, entitled, *The Birth and Babyhood of the Telephone,* which he delivered about a dozen times a year until his death in December, 1934.

On January 15, 1915, Bell in New York; Watson in San Francisco; Vail in Jeckyll Island, Georgia; President Wilson in Washington; and the Governor of California at Watson's side, inaugurated the first transcontinental telephone call. At one point in the ceremonies attending a perfect demonstration, Bell asked Watson to wait one moment. He then connected their first, primitive telephone to the line and said, "Mr. Watson, come here, I want you!" Watson, hearing perfectly, replied that it would now take a week instead of a minute to oblige him. "Forty years of telephone achievement," said Watson, "were condensed into a thrilling moment."

News of Bell's death reached Watson in a cabin near Long's Peak in the Colorado Mountains. Thus the two old men, laden with honors, took final leave of an association which began in their mutual labor to bring forth a prodigious artifact in a Boston garret. It is still startling to think that Bell was 29, and Watson 22, when they made that breakthrough to adventure to which all Bell System people who followed them owe their careers.

We are right to be proud of such founding fathers, two beacons of personality and character. Their example still stands as inspiration for the courage, intellect and concern for our fellow man which have been the hallmark of Bell System people, from highest officer to newest recruit. These attributes remain essential ingredients for our success as we near the threshold into the century of our history.

Mr. Boettinger is AT&T's Director of Management Sciences. This article is from a talk he gave to the General Assembly of Telephone Pioneers in September, 1972.

Toll Fraud: Beating the Rip-Off Set

The problems are fraudulent credit card and third number billing, plus electronic toll fraud (like the little "blue box"). The solutions are being vigorously applied.

During a three-day period last September, the 11th to the 13th, Federal authorities, acting on information supplied to them by local Bell telephone companies, arrested 14 persons for illegal use of the nationwide telephone network. The arrests were made not in one city, but rather in places as diverse as Chicago, Houston, Memphis, Minneapolis, Cleveland and Detroit.

Nor were the persons arrested the well known anti-establishment members of the New Left or the publicity-happy, self-styled "phone phreaks." Rather they were average, middle to upper-middle class American businessmen. Confiscated during the arrests were 16 operating and 6 partially completed "blue boxes," electronic devices designed to defraud the telephone company.

The arrests highlight two points. First, that toll fraud, electronic or otherwise, is socially and economically, as well as geographically, widespread. Second, that the Bell System is taking strong measures to prevent and eliminate the problem.

To be sure, the phone phreak now gets the lion's share of the publicity. The media, print and video, are naturally attracted to so vociferous, outspoken and, often, radical a member of our society. He uses a small electronic signalling device to tie up telephone circuits, avoids paying the toll charges and, in effect, beats the system. Seemingly lost in the glamour of publicity is the fact that no matter how you cut it, the phone phreak is a thief and subject to investigation and prosecution as a lawbreaker.

Title 18 of the United States Code (1958 Edition), Statute 1343, deals with "Fraud by Wire, Radio, or Television" and is quite specific. "Whoever, having devised or intending to devise any scheme or artifice to defraud, or for obtaining money or

property by means of false or fraudulent pretenses, representations, or promises, transmits or causes to be transmitted by means of wire, radio, or television communication in interstate or foreign commerce, any writings, signs, signals, pictures, or sounds for the purpose of executing such scheme or artifice, shall be fined not more than $1,000 or imprisoned not more than five years, or both."

Looking at the problem from the Bell System point of view, toll fraud can be divided into three separate categories: 1) fraudulent use of electronic devices to illegally enter the telephone network, 2) fraudulent use of telephone credit cards, 3) fraudulent use of third-number billing.

Bell System losses from credit card and third number cheats amounted to $22.5 million in 1971 while losses incurred from electronic fraud are almost impossible to estimate with any degree of accuracy. A closer look at each type of toll fraud may show that each must be dealt with as a separate problem with different solutions.

The ubiquitous blue box

As stated before, electronic toll fraud in the shape of the ubiquitous little blue box, is the most widely known. Called the blue box simply because the first one ever confiscated was blue, the device enables its user to become, in effect, a long distance operator. By pressing certain buttons on the box, the user (known in the press as a phone phreak), can send tones over the telephone line, triggering responsive network activity and enabling the "capture" of a long distance circuit. This alone, according to some more outspoken phreaks, is a part of the thrill of "phreaking."

Phreaking can include "fun" such as using a telephone in the left hand to call another telephone in the right hand by way of, say, London. Or it can be a matter of making a conference call to as many as 10 or 12 other phreaks spread around the country. Or perhaps the phreak simply likes to hear sounds, the echoed pings, beeps, buzzes and clacks as his call wends its way through the worldwide network so he can hear the weather forecast in Moscow.

Contrary to popular opinion which places responsibility for its growth on everything from the radical left to the explosion in miniaturized electronics, to better scientific training in the nation's elementary and high schools, the blue box has been around for at least 10 years. It has, in that time, varied in color, size and degree of sophistication but has been invariably homemade. Another popular misconception is that *anyone* can make a blue box. This is true only if that *anyone* has a keen knowledge of electronics and the telephone system and possesses a high degree of mechanical skill. Most of those who deal in electronic toll fraud, therefore, are intelligent and, often, creative people.

Sterner measures needed

Detecting blue boxes on the network has become somewhat simpler since the first one was discovered about 10 years ago. At that time, the device was considered nothing more than an annoyance and was treated as such. Prosecution for the offender was either slow or dropped when he agreed to pay a bill. But as the use of blue boxes increased, it became apparent that sterner measures were needed.

Today there are several ways to detect blue box usage, running from the time-consuming check of accounting office AMA tapes to much faster ways such as network scanning devices. Two such prototypes are now in use in two toll offices in widely separated parts of the country. Security and AT&T Engineering are constantly working with Bell Telephone Laboratories for faster and more economical ways to detect and prevent blue box calls.

The second and third types of toll fraud are usually lumped together—fraudulent credit card and third number billing. On these two categories of toll fraud, loss figures are available. In 1968 the Bell System lost $3.5 million; in 1969, $6.9 million; in 1970, $28.3 million; and in 1971, $22.2 million. The rather dramatic rise in credit card and third number fraud from 1969 to 1970 has been attributed to many things, from the much publicized Hollywood star hoax in 1969 to the ever-growing number of underground papers advising readers how to make up phony credit card numbers.

The Hollywood star hoax was just that—a hoax. A big-name actor was reported to have been disenchanted with his personal WATS service and was said to have taken out a nationwide ad inviting anyone to call long distance using his credit card. Of those apprehended for using the credit card number, none admitted that he or she actually saw the ad, and, in point of fact, the movie star himself denied ever having had it printed. The rumor spread by word of mouth. Even so, such a hoax could not account for such a sharp rise in toll fraud. Rather, it served to bring the subject of credit card fraud into the press, which in turn blew it all out of proportion.

Bell System security people say that the young (students, hippies, military personnel) and members of all ages of the radical underground movement account for the major share of these calls. But there also have been offenders among such diverse groups as businessmen, lawyers, housewives, even the clergy. Yet the persistent question is: why do they do it?

First a lamb, now a lion

People who wouldn't think of stealing something from a store seem to readily commit theft by wire. It would appear on the surface that theft by wire is not equated by these people with theft of an object. The radicals call their fraudulent efforts "people's justice." They evidently feel that stealing from the telephone company (representing the establishment) is a good means of protest. But they are really stealing from the public by illegally using services whose costs are ultimately borne by the public.

Somewhere between the radical and the establishment-type is the student. Most students apprehended for toll fraud say that they used fake credit cards as a temporary expedient when they had little money.

A "reformed" credit card thief quoted in a trade magazine a few years ago explained the "logic" behind fraudulent calls: 1) persons who have telephone credit cards are usually wealthy enough to afford a single extra toll call if the random selection of numbers used by the toll cheat happens to hit them; 2) if the credit card holder notices an extra call, he or she can complain to the telephone company and get a corrected bill; 3) the phone company can afford such minor losses because it's a huge corporation.

Indeed for many years Bell System companies were quite lenient with persons who committed toll fraud. Whenever possible, the company would first attempt to stop the calls, collect on them and stay out of court. But that was long before more than $20 million a year was being lost to toll cheats. Almost overnight, it would seem, the lamb has turned into a lion. The Bell System now enjoys the reputation of being a ready—and very successful—prosecutor.

A task force is formed

Consider the following statistics. In 1970 there were 215 arrests for toll fraud and 207 convictions (most arrests and convictions coming toward the end of the year). In 1971, when the "get tough" policy got into full swing, there were 330 arrests and 255 convictions.

Perhaps the single most important reason for the crackdown on toll cheats was the formation at AT&T of the Toll Fraud Control Program Task Force in April of 1970 led by Security. The task force was formed to review current company practices and procedures for handling credit card and third number fraud with an objective of providing interdepartmental recommendations and departmental guidelines to control the growing problem. The task force was made up of a representative from Traffic, Comptrollers, Commercial and Security.

There were obvious weaknesses in the company's practices which the new control program sought to remedy. The recommendations made after a six-month study have been adopted by all associated companies and the $6 million drop in toll fraud from 1970 to 1971 speaks for the program's effectiveness.

Among the recommendations were these: that the "first line of defense" against credit card and third number frauds—the operators—be trained in new techniques on how to identify the customer who wants more than his dime's worth; the Responsible Company Toll Investigation Plan, whereby the originating (as opposed to billing) office became responsible for investigation of unbillable or unidentifiable credit card and third number calls which led to early detection and correction, plus aggressive prosecution; a change in toll office computer programming; more precise traffic pattern analysis; and the forming of centralized ticket investigating groups in each revenue accounting office.

The task force also recommended that all company interdepartmental toll fraud committees should concern themselves with the prevention and reduction of all types of toll fraud including the varieties of electronic toll fraud. This interdepartmental effort both at AT&T and the companies is providing a more concerted and aggressive effort to protect the System's revenues.

Security people at AT&T believe that the control program proved itself during 1971 and, when figures become available for 1972, a more marked decline in toll fraud losses will be evident.

Problems like toll fraud will probably exist as long as there is a telephone system. There will always be the temptation to "beat the system" either as a form of protest or for personal gain. Also, it is virtually impossible to design and engineer a system for mass use that can't be thwarted by human ingenuity.

Yet preventive measures such as those outlined above offer part of the solution to toll fraud. Perhaps the other part is a program of education about the costs of this crime—both to the public and to the perpetrator, when he or she is caught.

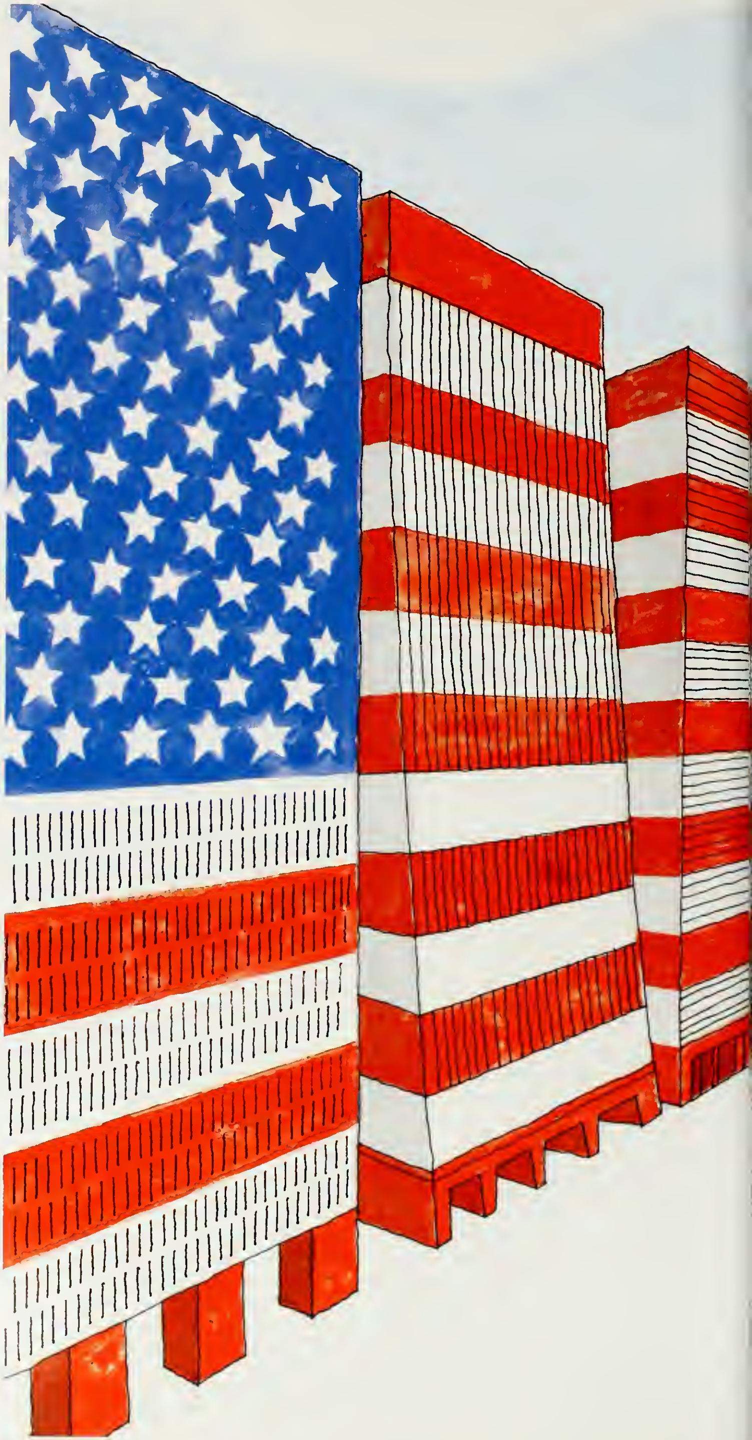
Because almost all fraudulent toll calls cross state lines and are thus under Federal jurisdiction, vigorous governmental investigation and prosecution, with the Bell System acting as witnesses for the prosecution, is a third effective method of prevention, albeit one of deterrence.

Yet, under such a three-pointed attack, it would appear that widespread toll fraud hopefully will be a thing of the past. ☐

The businessman as volunteer in community action programs is seen as a measure of corporate commitment.

Over There

by Dan H. Fenn, Jr.



Despite articulate and persistent warnings from the political right, the political left and many a minority stockholder that businessmen should tend to their own knitting and leave the community alone, more and more business executives are involving themselves in more and more volunteer activities. And there is no evidence to indicate that a business slump puts the brakes to this long-term trend.

Both business managers and spokesmen for voluntary organizations agree on this increased participation. Said one businessman recently: "Within my own span, it's changed. We can't pull down the shades and play within our own companies anymore. This has not always been true, but it is today."

Furthermore, this volunteering is not of the "chairwarmer" or "letterhead" variety. Businessmen almost universally reject that kind of participation, and the executives of voluntary agencies say that, though they do have problems with business volunteers, absenteeism and inactivity are not high on the list.

I do not mean to imply that businessmen are stepping forward voluntarily in response to the call more than others (actually, the term "volunteer" is misleading, it should be "recruit"). These recruits respond positively to requests for help from organizations when con-

vinced that the work is important, that there is a need for their particular talents, and that the organization is focusing on problems which fit with their particular interests.

Who are these recruits? Are they older men in middle-management who cannot put it together in their large corporations seeking status in another environment? Or are most of the active volunteers small businessmen who have need for close relations with the community of which they are a part? According to a recent study conducted jointly for the Center for a Voluntary Society and the *Harvard Business Review*, by Daniel Yankelovich, Inc., executives of non-profit agencies overwhelmingly report that their best, most active volunteers come from the top ranks of large companies.

The business manager who is active in his community is probably over 46 (only 7 per cent were under 35 according to the study). The odds are better than three to one that the recruit is from a big firm. And the higher up he is in the business, the more likely he is to be both active and effective.

Incidentally, the service industries are much more likely to produce active business volunteers. As one agency staff member put it, "Manufacturing guys are the hardest to involve; the men from service industries are far more people-oriented by comparison."

What are all these people doing, if they are not simply providing respectability to the organizations with which they are associated? As one would expect, they are heavily involved in fund raising, and more than a third of those responding in the Yankelovich study had been called upon to head such an effort.

In addition, they are occupied with the internal procedures and operation of the agency; they help plan and establish the organizational structures, and they work on budgeting and fiscal control. Interestingly enough, they do not seem to be anywhere near as involved in the substantive activities of the group, nor do they concentrate on providing liaison with other segments of the community including their fellow businessmen.

All this volunteering is not without its frustrations. When businessmen are asked what they find difficult about their participation in non-business organizations, they say it's irritating to work with groups of incapable people who, because they are donating their time, cannot be fired or even disciplined. Others complain about the amount of time wasted and the slow rate of progress in comparison with the business world. Still others find the effort to reconcile the conflicts among individuals, groups and the organization's objectives both trying and annoying.

Perhaps even more important, they feel both under-utilized and misplaced. When you compare what business executives say they would *like* to do in voluntary agencies with what they are actually doing, you find a real mismatch. For example, fund raising is frequently at the top of the projects they are asked to undertake; however, this rates well down the list of tasks which appeal to them. Many managers would prefer to tackle promotion and public relations tasks, but are much more likely to be asked to handle a range of other responsibilities. They would like to be involved in organizational staffing but are seldom asked; they would like to build relations with other organizations but are often bypassed on such projects.

All these difficulties are magnified when it comes to contemporary organizations, which are characterized by the active participation of those whom the organization is designed to serve. The incompatibility of business leaders working with members of these groups has serious implications for both sides.

The Poverty Program has been vigorously damned and the Office of Economic Opportunity has been so changed as to make it virtually unrecognizable, at least partly in response to public disappointment and disapprobation. I suspect, however, that when historians view the decade of the sixties they will remark with some astonishment that this society had the courage and the moral conviction to launch and nourish two revolutions against itself; a revolution of the blacks and a revolution of the poor.

The latter revolution began when the idea of "maximum feasible participation" of the poor themselves in programs set up to benefit them was made a cornerstone of the philosophy of the O.E.O. With the establishment of this philosophy a step was taken from which there was no retreat. It was truly an idea whose time had come, and there was no stuffing it back into the box.

That philosophy changed the nature of many traditional organizations in which businessmen participated, and created vast numbers of new organizations. This altered environment caused real difficulty for large numbers of business volunteers who felt more at ease in a group of their own kind of people than in a setting foreign to them.

Here is what some of the businessmen had to say about their personal experiences:

"I served on one of those boards that was suddenly changed to include neighborhood people. It was kind of an experience to meet with them, and now I feel I know them. But when they began to take over, to do things like setting meeting times when they knew the businessmen couldn't come, we all agreed that it was hopeless to try to work in that setup and decided we would just supply funds instead."

Said one businessman: "You know, I am uncomfortable about the amount of leverage the business community has in this city."

"As a result of my experiences, I believe in self-perpetuating boards, because they don't break down the way the democratic ones do."

"I was a director of our local poverty program, but there was just a fantastic amount of frustration. I was on another board which legally had to be enlarged to include representatives of the poor—and it was awful. They used our board as a forum to grind their own axes. They can't see what you are trying to do because they are so bugged by what is bothering them at the moment."

So the tendency of business executives is to retreat to the hospital boards and the large health agencies and the church committees and avoid these heterogeneous, disorderly, activist and contemporary organizations. Obviously, such a strategy has its hazards. I well remember one thoughtful businessman in a city where the Chamber of Commerce and other business groups played—and still play—a preeminent role in community affairs. He said, rather pointedly:

"You know, I am uncomfortable about the amount of leverage the business community has in this city. It has filled a void in the political leadership up to now and has, in general, done it well and constructively. And the community as a whole has gone along. But is this really the right way to do things? And how long will it work?"

One other characteristic of business volunteer service which should be mentioned is the failure of businessmen to take a leadership role in the non-profit organizations of which they are a part. While this is particularly true of the contemporary agencies, executives of more traditional volunteer agencies sound a similar complaint. The volunteer most admired is the one who "provides leadership and creativity," who "pilots projects," who is "enthusiastic, sincere and thorough." The one not liked is the one "lacking in interest," "lacking dependability" and "not self-assured."

The average businessman, according to agency executives, tends to hold back, to require staff leadership and even manipulation, to be hesitant and shy about exerting the kind of initiative and force which has made him a success in his company. Perhaps herein lies the answer to the mismatch between what businessmen say they would like to do in voluntary agencies, and what they are actually doing. One agency head complained:

"We have to do all the planning and the spadework on a project and present it to our business 'leadership' as a *fait accompli*. We make (the basic) decision and then go to him and say 'We are going to have a new stadium. Will you head a committee to decide where it should be and how it should be financed, and get it built?' In other words, the businessman is an excellent implementer but he is neither a leader nor a generator of ideas."

One might well ask, at this point, if there are all these problems for the business volunteer, why does he get and stay involved? Why is business volunteering on the increase? Why do those who are participating say clearly that if they had it all to do again, they would still accept the invitations and join up?

For one thing, whatever the theoretical rights and wrongs of community involvement listed by the previously mentioned conservatives, liberals and minority stockholders, the parties most directly concerned—the agencies and the people whom they serve and represent—expect and welcome the business manager to civic enterprise. As a matter of fact, very few businessmen are really aware of just how strongly the community feels about their participation.

Not long ago I conducted a study of the contributions made by companies in Boston to solving urban problems and the attitude of Bostonians toward their efforts. One of the most striking findings was the gap between the way most businessmen view this kind of endeavor and the way the community sees it.

To executives, involvement in the problems of the city is a "good project" which they should undertake, assuming the economic situation is propitious and other concerns are not more pressing. But they do not see it as an inescapable obligation which their company assumes simply by virtue of its presence in the city. The community on the other hand, expresses its opinions on the subject clearly: they have added the requirement of community involvement to the other more traditional corporate functions like paying good wages, providing decent working conditions, manufacturing a product that works and supplying honest customer service.

In addition, pressure is coming from within the companies to take a more active interest in community affairs. "I keep trying to get across to my management," a public affairs officer said recently, "that we are *guests* in our headquarters' city, and it is time we started acting that way." Certainly the young people in corporations are providing a special kind of urgency to the whole concept of community service; and we should not underestimate the degree to which all of us are caught up in the changing demands of these new times.

Secondly, as a recent study by a group of graduate students at Hofstra University discovered when they looked at New York's Nassau County, the number of boards, commissions, advisory committees and *ad hoc* study groups in local government is expanding dramatically, increasing both the opportunity for businessmen to serve and the requests that they do so. The needs, in short, continue to grow.

Pure altruism is clearly a powerful motivator for some managers. One corporate president put forth his reasons for volunteering in the following manner:

"You know, you get involved for selfish reasons. Sometimes I wake up early in the morning and wonder what I'm really here for. If it isn't to make a contribution, I don't know what it is."

Corporate leaders are quick to see the relationship between the character of the community and the future of their firms.

Further, corporate leaders, looking out over the city from their high-level offices, are quick to see the relationship between the character and stability of the community and the long-term future of their company. This is particularly true, of course, of major service industries which simply cannot move to the suburbs. Said one top manager recently:

"If we can improve the community in which we live, we can expand our business here. Otherwise we'll have to decentralize our operations to other parts of the country, which we don't want to do, or we'll have to make ourselves into a fortress."

But all that is a familiar story. What we have not recognized is the degree to which both companies and executives look on volunteer service in extremely pragmatic, down-to-earth terms.

From the company standpoint, the loss of a man's time from his job to serve in a volunteer capacity is often offset by advantages to the firm. Volunteering maintains and increases an employee's loyalty to his company and provides an outlet for creativity; it serves as a form of management training; it provides a source of information about what is going on in the community; and it gives top management another fix on a man's capabilities when promotion time comes around. A few comments from industrial leaders highlight these points:

"When a young man came to work for us, he used to sit right out here on the floor. Now we put him on the eighth floor, analyzing or computerizing something. He's never going to get a feel of this town from there."

"You know, a lot of the management jobs in this business aren't all that interesting. Unless people are expending their energy, leadership and creativity outside the company, they are going to get frustrated very quickly."

"We just wouldn't have any idea what was up in this city if it weren't for this volunteer service. Just the other day one of our young people came to me with some information about some concerns that a group of citizens had. It would have caused us real difficulty if we had not learned of it in time to do something about it."

"We encourage our executives to be active. It makes them more visible in the company and thus contributes to their promotion."

For the individual manager, aside from the satisfaction of volunteer service and the managerial experience he gains, the relationship in a large—and growing—number of companies between promotion opportunities and volunteer service provides a special kind of incentive for this kind of activity. Even where there is no stated policy encouraging such service, nor any direct evidence that credit is given for community involvement, the connection seems somehow to be in the air. One manager told me that it was almost inconceivable for a person to rise to the upper ranks in his firm unless he were working on some volunteer projects.

Of course, there are corporate and individual hazards, too. One company which encouraged community activity went through the unhappy experience of watching a somewhat extraordinary individual emerge from its laboratories to become a candidate for the local school board. He went around trumpeting a wide range of highly unpopular views. Another company suffered in silence when a cantankerous union leader ran for a public safety inspector's job in an area where the firm had extensive operations.

Then, too, there is always the risk of failure in these volunteer projects. And, obviously, the energy, time and attention of a company's top executives can be so diverted from the day to day needs of the enterprise that it could suffer.

But most businessmen and most industrial organizations today are opting to override the theoretical arguments against voluntary participation and accept the risks inherent in it. Given that fact, it would seem appropriate for businesses to maximize the effectiveness of this particular expression of corporate responsibility.

There are at least three things a company can do to aid volunteer effort: the establishment of a company policy on the subject, the development of a training program, and the organization of a volunteer "job mart" within the firm.

The establishment of a policy on volunteering is perhaps the first step a company should take. It need not be extensive, but it should be written down and widely distributed. It is significant that the "users" of business volunteers, the staffs of voluntary agencies, overwhelmingly believe that clear and positive corporate support upgrades the effectiveness of the service that businessmen provide. Furthermore, such a policy statement does stimulate corporate executives to be active, and encourages (or releases) them to involve themselves in more organizations.

Another step might involve encouraging a company's junior executives to broaden their experience through volunteer work. In the Hofstra study, 70% of the executives surveyed felt that some kind of material about the nature of volunteer service should be built into regular company management development programs for junior executives. Business volunteers generally complain that they get little, if any, orientation training from the agency which they are serving. A full 45 per cent of the people in the Yankelovich study reported that "it takes too much time and trouble to learn what the voluntary organization wants and requires of you." By the same token, few volunteer agencies, apparently, have thought orientation programs necessary for upper-level business volunteers.

It is true, of course, that the agency itself has to carry the major responsibility for the specific explanation of its needs and functions, but companies could undertake the task of briefing managers about the facts of volunteer life, including the need for them to take more leadership. Such an effort becomes particularly appropriate in an environment in which both company and executive see such service as in their self-interest.

The establishment of a policy on volunteering is perhaps the first step any company should take.

And finally, if it is true that the corporation has much to gain from increasing the numbers of its executives serving in community posts then it might well consider organizing that participation.

One danger inherent in such a suggestion, more apparent than real, is that the community will be resentful if it feels the company is stimulating volunteer service in its own self-interest. In the Boston study, however, community leaders said they expected a company to act in its own interest and fully accepted the fact that it would do so. One could even surmise from their statements that they are pleased when there is a match between the company's benefit and the community's for then there is a firmer guarantee of longer-term involvement. At any rate, a straightforward statement of policy of "doing well by doing good" may be far more acceptable than most businessmen might otherwise believe.

At the beginning of this article I placed the matter of community volunteers in the context of the current interest in the social responsibility of business. One of the characteristics of that concern is enthusiasm for the idea of a "social audit," some way of measuring a company's performance in the noneconomic aspects of its activities. There are so many versions of such an "audit" today, so many definitions, so much confusion between hope and reality, so many different purposes, that the term is still almost meaningless.

But one thing is clear: if the community and the businessman have not yet developed all the tools necessary to measure the extent of the corporate contribution with any real precision, the community has developed one crude, subjective measure. It simply asks, "Do you really care?"

In answering that question, the community looks at the way a company goes about the social programs it chooses to undertake to determine if the company is seriously committed to helping the community. Success or failure of a particular project does not seem to be nearly as important as evidence of a real and continuing concern.

A systematic and constructive effort to do something to strengthen the effectiveness, the quantity and the quality of the performance of businessmen as community volunteers is one of the credentials which many communities are seeking, and one measure they are using, to determine whether a company is truly "socially responsible."

Dan Fenn, Jr. is the director of the John F. Kennedy Library in Waltham, Mass. He is the co-author of Business Decision Making and Government Policy, *the editor of a seven-volume management series published by McGraw-Hill and author of numerous articles dealing with business relations. He is a Senior Associate of the Harvard-MIT Joint Center on Urban Studies and teaches at the Harvard Business School.*

EDITORIAL

Some Other Anniversaries

Twenty-five years ago Bell Telephone Laboratories dropped the transistor into a post-war environment bustling to make up for lost time, and its effects are still rippling out—as the James Rogers article notes in this issue—"to every quarter of the globe." Today we retrace its radial significance back to the hub of that event with some wonder, if not outright perplexity, that a development of such universal consequence could have passed virtually unnoticed.

Technological revolutions should come with drum rolls and exclamation points—even though some might hold that this one has been more of a technological riot, in the sense that the abrupt and multitudinous changes the transistor has fostered have been of so general and spontaneous a nature.

The Rogers article recalls that no one at the time had a clear view of the impact the invention would have, no doubt including Brattain, Bardeen and Shockley as well. It is unlikely, for example, that any one of them could have said, "Gentlemen, we are now entering the Transistor Age." That would have been a little bit like the English humorist Max Beerbohm's always wanting to write a curtain line in which a handsome young Hussar took heroic leave of his beloved with the words, "Goodbye, my darling, I'm off to the Thirty Years War."

We know from ample, present evidence that innovation is alive and well at Bell Laboratories. Drawing on another fashionable phrase, we could also say it is not only alive and well, it is out of sight. And that's true not only as a vernacular measure of the usual quality of such innovation (its gee-whizziness), but as a description of the process itself. Procedurally, innovative developments are "out of sight" at Bell Laboratories because the ideas—the scientific or technological discoveries on which the developments are based—will normally not be widely known until they emerge in their finished, material form some time, often years, after their conception. As just one example, communication by millimeter waveguide, something comparatively new to most of us, was being considered by a Bell Labs physicist 50 years ago.

There is one qualification to all this, however, and it brings us, by an admittedly circuitous route, to the subject of this editorial.

Something else was being considered 50 years ago. And that was the creation of *The Bell System Technical Journal.* Fortunately, the idea carried, and we are pleased and proud to join in marking the anniversary today. It would not be easy to find a more widely regarded or productive publication in all of industry—or, for that matter, in the general field of scientific inquiry. And the qualification its mention introduces probably needs no emphasis: that while developments in progress at Bell Laboratories may not be generally familiar, the *Technical Journal* has been unfailing, and highly successful in its program to keep the scientific community informed.

In its recent anniversary issue, the *Journal* recalled its original charter as embodied in the Foreword to its first edition:

"This perceptive and prophetic note by the founders of the BSTJ states clearly their conviction that the art of telecommunications would require the ever-increasing application of scientific knowledge and the scientific method, and that this effort would, in turn, expand the boundaries of human knowledge in many fields. The BSTJ was planned to make these advances available to the world, treating a range of subjects 'as broad as the science and technique of electrical communication itself.' "

In answering how well it has met its responsibilities, the *Journal* cited some of the technical papers it has published, and the names and subjects roll on in an unsurpassed chronology of progress: Fletcher on "The Nature of Speech and Its Interpretation" (1922); Davisson's "The Discovery of Electron Waves" (1938); "The Magnetron as a Generator of Centimeter Waves" by Fisk, Hagstrum and Hartman (1946); Shannon's "A Mathematical Theory of Communication" (1948); "Automatic Switching for Nationwide Telephone Service" by Clark and Osborne (1952); and on and on through the pioneering work on such developments as the traveling-wave maser, the laser, computer and materials sciences, superconductors, satellite communications, electronic switching, Picturephone® systems, charge-coupled devices, magnetic bubbles, low-loss optical fibers . . .

And yet, a partial list. It is probably no exaggeration to say that any number of emerging nations could furnish themselves gloriously on just the material the *Journal* has not had space to publish, on the spillover alone.

So, in short, we are happy to support the view that *The Bell System Technical Journal* has been meeting its responsibilities very well, thank you, and to wish it at least the same measure of success in the years ahead.

We should only like to acknowledge two other anniversaries in closing. The first is our own. The *Bell Telephone Magazine* is also celebrating its 50th year, and we are modestly pleased about that, too.

The second anniversary is one to which all others defer. It's a little early, but inasmuch as this is the November/December issue, we should like to extend to everyone—ready or not—our sincerest wishes for a joyous holiday season.

Bell
TELEPHONE MAGAZINE

JANUARY-FEBRUARY 1973

KANSAS CITY, MO.
PUBLIC LIBRARY
JAN 3 1 1973

Bell
TELEPHONE MAGAZINE

VOLUME 52 NUMBER 1 JANUARY/FEBRUARY 1973

2 **How to Live on $9.5 Billion for a Year**
By Hubert L. Kertz
How we raise and spend our annual construction outlay.

10 **The Healing Art: A New Dimension**
By Don Woodford
Telephone and computer combine to bring new accuracy and effectiveness to radiation therapy.

14 **Success Story**
International Direct Distance Dialing, 20 countries at your fingertips.

18 **The Spanish Surnamed in America and the Bell System**
A two-part article examining the problems and the opportunities of Spanish-surnamed Americans.

26 **The New Safety Factor**
Unveiling the new *Bell System Accident Prevention Plan.*

28 **Turning Points**
By William P. Kuhs
Horace P. Moulton reflects on major legal decisions that affected the Bell System as he looks back on his years as AT&T's top legal advisor.

John D. deButts
Chairman of the Board
Robert D. Lilley
President
William L. Lindholm
Vice Chairman
Frank A. Hutson, Jr.
Secretary
John J. Scanlon
Treasurer

Leonard Moran
Editor
Al Catalano
Art Director
Donald R. Woodford
Managing Editor
Edward J. Swartz
Associate Editor
William P. Kuhs
Associate Editor

Published by
American Telephone
and Telegraph Company
195 Broadway,
New York, N.Y. 10007
212 393-8255

From the smallest frame to the mightiest multi-storied switching center, each new piece of the network must fit precisely, work efficiently and stand ready to provide service when customers expect it. This is our objective

How
to
Live on
9.5 Billion
or a Year,
or:

WHY A CONSTRUCTION BUDGET?

by
Hubert L. Kertz

How to Live on $9.5 Billion for a Year or WHY A CONSTRUCTION BUDGET?

Annually, the associated companies and AT&T issue press releases and reports about Bell System construction expenditures for the coming year. Generally, the expenditures are expressed in numbers that are virtually inconceivable within the range of our normal standards of monetary reference, such as food bills, mortgage payments, rent, car payments, savings and investments. This year is no exception; these expenditures are estimated to be $9.5 billion.

No doubt the usual response has happened again. The figure is first conceded to be astronomical and then placed in that mental compartment where we keep numbers about the distances between stars, or the atoms in a cup of water. However, the figure assumes due significance through the fact that it represents the accumulated efforts of thousands of people making literally millions of decisions concerning forecasting, planning, financing and building.

Probably, then, the question has arisen: Why should we spend so heavily?

In a word, the answer is *service.* We are expected to be ready to supply service whenever and wherever our customers request it. This is the nature of the telephone business. We do not want to be in a position of having to say no to the market place. We wouldn't have it any other way. We have no other reason for being.

The $9.5 billion we intend to spend on service comprises four categories of expenditures: $6.4 billion for *Growth*; $1.4 billion for *Customer Movement*; $500 million for *Plant Replacement*; and $1.2 billion for *Modernization.*

The *Growth* component, as one might expect, constitutes the largest portion of the construction budget, about two-thirds of the total. The major portion of these expenditures evolves from demand for new telephone service by both new and existing customers. These expenditures are determined using the forecasting process. Main telephone and equivalent main telephone gain, increases in long distance message volumes, upgrading requests and extension development, all must be estimated for a particular year. Our objective is to add the necessary plant so that service to all our customers—both existing and new—will be available when our customers expect it.

In 1973, we will add enough plant capacity to service 2.6 million new customers. In addition, the expenditures required due to the increased calling habits or higher usage of telephone plant by existing customers are sizeable. Just to handle this higher telephone usage in 1973 involves adding capacity in our local central offices approaching the equivalent of about 600,000 main telephones. This calling capacity is equal to that which is required to serve a city the size of Cleveland, or Washington, D.C.

The remaining expenditures in the growth category will be used to maintain margins of operating capacity at reasonable levels. These levels of margin are based on factors which must take into consideration both economics and an adequate reserve required to meet unexpected service demands.

The second category of expenditures is called *Customer Movement* and is associated with relocating telephone service. This is a category over which management obviously

Budget allocations are made in four major categories.

has limited control because these expenditures are generated by the increasing mobility of Americans.

Outlays in this area are projected to exceed $1.4 billion in 1973. Discounting inflation, this is 45 per cent higher than actual 1966 expenditures.

The next category of capital expenditures is called *Plant Replacement*. In 1973, plant replacement expenditures are projected to be $500 million. Generally, this capital is spent to replace worn out equipment and to relocate facilities to meet public requirements—such as a highway project that forces us to relocate outside plant. Another contingency in this category would be expenditures to restore service impaired by a storm or other natural disaster.

Modernization expenditures—the remaining category—are made primarily to introduce greater operational efficiency, improve working conditions and provide better service to our customers. Expenditures in this area include replacing older electromechanical central offices with electronic switching systems (ESS), and the replacement of manually operated switchboards with the new cordless consoles of the traffic service position system (TSPS). Other modernization projects include provision for automatic intercept and number identification systems, dial-tone-first for coin phones, network improvements, and other improvements and refinements.

Electronic switching systems are designed to operate more efficiently and with less wear—hence less repair and trouble—than the electromechanical systems. They can handle greater volumes of traffic, and they are more flexible in that they allow us to offer, economically, several "custom designed" revenue producing calling services. And so, it is easy to understand why construction plans for 1973 have the Bell System companies projecting installation of 2.6 million ESS central office lines. Of this number about 1.9 million will replace lines now served by older, electromechanically operated switching equipment. By the end of this year some 5.7 million main stations will have access to ESS central offices.

TSPS, like its electronic cousin ESS, also provides us with several distinct operating advantages. With TSPS capability, customers can dial credit-card, collect and pay station calls with a minimum of assistance from the operator. It provides a savings in that its largely electronic call processing accelerates the flow of traffic while requiring far less manual effort on the part of the operator. Working environments for the operators improve because TSPS, unlike the switchboards it replaces, permits the location of offices at points distant from the central unit. This affords the possibility of placing operator locations in a wide variety of urban and suburban settings.

By the end of 1973 we anticipate that 25.6 million main stations will be served by TSPS. This is a 26 per cent increase over 1972.

Modernization such as ESS and TSPS upgrading results in three major advantages: better service, a savings in operating costs, and an improved working environment for the Bell System employee.

These construction expenditures would be substantially higher were it not for the emphasis the Bell System places on cost controls involving improved utilization of existing facilities and reuse of equipment and materials. Just about every-

thing, from telephone sets to switching apparatus, is recycled wherever practical. They are returned to use in refurbished form by the Western Electric Company or are reclaimed in their basic elements at Western's refining plant in New York.

Apart from other programs—such as the "snip-and-take" plan in which a customer takes his telephone along with him when he moves, thus reducing removal time and set losses—the recycling effort is expected to save some $200 million in the 1973-1974 period. And we expect this sum to become more substantial in the not-too-distant future.

Prudent provision of telephone plant for growth, customer movement, plant replacement and modernization—these four requisites of good service—necessitate our spending $9.5 billion this year to meet anticipated needs. And if one condition about our business is a certainty, it is that demands will continue in increasing variety and volumes.

Another certainty is that we will continue to be expected to spend *all* that is necessary to meet our service demands. At this time, we expect to raise 1973's $9.5 billion as we have in the past, from two basic sources: internal and external. External sources are the investors, generally outside the business, who may purchase our debt issues (notes or bonds) or our equity issues (preferred or common stock). We anticipate having to acquire about $4 billion from external sources. This is provided that our earnings over time will support a reasonable return on the investors' capital. The remaining $5.5 billion of construction funds will be secured internally from sources such as depreciation, deferred taxes, and reinvested earnings.

Depreciation includes the capital recovered based on prescribed depreciation rates, whereas deferred federal income taxes result from accelerated tax depreciation, plus other tax benefits from the Asset Depreciation Range (ADR) and Job Development Investment Credit (successor to Investment Tax Credit).

To explain these terms briefly:

- The amount of money we are allowed to recover through depreciation is the original cost of plant less its estimated salvage value at retirement. If a unit of plant cost $1,000 and its salvage value is estimated to be $100 when retired after a ten-year life, we recover $900 over ten years, or $90 each year. The $90 per year is classified as an operating expense on our books. These dollars are not, however, paid out; they are plowed back into the business and help to maintain the capital belonging to the investor.

- Accelerated depreciation, which the Bell System elected to adopt in 1970, allows larger depreciation deductions for tax purposes during the early years of a unit's life and less during the later years of life. Under accelerated depreciation the total tax deductions over the life of the unit are still limited to the cost of the unit less its salvage value, but the change in the timing of these deductions tends to defer a portion of our income tax liability until later years. These tax deferrals are available for investment in the business until required to meet the greater tax burden in later years.

- The Asset Depreciation Range (ADR) system was created by the Revenue Act of 1971. Among its features was a provision which permitted shortening—by as much as 20 per cent—the life used in calcu-

Earnings must provide a reasonable return on capital.

lating tax depreciation rates for plant installed after 1970. These shortened lives, together with accelerated depreciation, make additional money available to us in the form of deferred federal income taxes. The customer benefits through our use of this interest-free money.

- Job Development Investment Credit (JDIC) is a credit against income tax allowed in conjunction with the purchase of certain plant. That is, if our unit cost $1000, with an investment credit of four per cent, then for the year it was installed we would get a $40 credit applicable to our income tax, which would be invested in new plant.
- Reinvested earnings are the portion of net income which has not been distributed to shareowners as dividends but rather reinvested back in the business. They provide a source of capital to the company and serve to form the basis for future growth in earnings per share.

These are the means, then, by which we plan to finance construction for the fourth year of the 1970's.

The '70s brought with them unprecedented demands and an inflated economy.

We came into this decade aware that the future would do its best to exact unprecedented effort from us. The decade began by presenting us with an economy feverishly inflated. The nation's gross national product exceeded, for the first time, the *trillion* dollar level, but in terms of spending power the gross national product was no higher than mid-1969, while industrial production leveled at 1968 output.

Interest rates were high; construction demands on Bell operating companies were great, and the inflation seemed to be continuing at record high levels. Consequently, 1970 was a year of slow revenue growth, high expenses, and lower earnings for the Bell System. Earnings dropped slightly in 1970 to $3.99 a share compared with 1969's $4.00. The lack of any growth in earnings per share in 1970 and 1971 was a major factor in the poor market performance of AT&T stock. Growth and earnings per share must be maintained to insure the attractiveness of AT&T as an equity investment.

Earnings might have slipped even lower had not two essential steps been taken: We tightened our budgets and curtailed expenses wherever possible, and we applied for rate increases, both interstate and intrastate.

This is the way it was stated in the Annual Report for 1971: "To some, the Bell System's current drive for increased rates may appear untimely, coinciding as it does with a concerted national effort to stem inflation. What should not be forgotten, however, is that for almost a dozen years, the general level of telephone rates in this country remained virtually unchanged. In the case of long distance, they have actually gone down. We have fought the good fight against inflation year in and year out, and we intend to keep on fighting it. But we cannot continue to absorb the cost surges of recent years without serious jeopardy to our ability to attract the capital to meet future service requirements. Getting our rates up to levels that realistically reflect the cost and value of our service is a prime objective of management and one we intend to pursue vigorously."

The practical lessons, then, of the first three years of this decade have imbued management with a sharper sense of the variables in the cost/service equation and stim-

ulated, on the one hand, the impetus to tighten expense controls, and, on the other, the determination to seek rate increases to bring the price of our services up to what it costs to provide them.

Having discussed why we have a construction budget, the question that logically follows is: How is it developed?

The process begins with long-range planning—the telescopic view that gives us an indication of the total service environment we will be operating in, while allowing us time to decide how best to operate in that environment. This is coupled with short-range planning, which spans a 3-year period. This short-range planning is our prime tactical effort which should help fulfill our strategic, or long-range goals.

For illustration, it could be said that this planning process is carried out in two basic steps:

In the first step, we must consider what new, modernized or added services will mean in terms of the facilities and equipment required to provide those services, and the capital requirement involved.

The process must also take into consideration the nature of our switched network which is, in a very real sense, a growing system. In planning its expansion or modernization, we are forced to fold the future into the present. What we add tomorrow must work compatibly with what we have today.

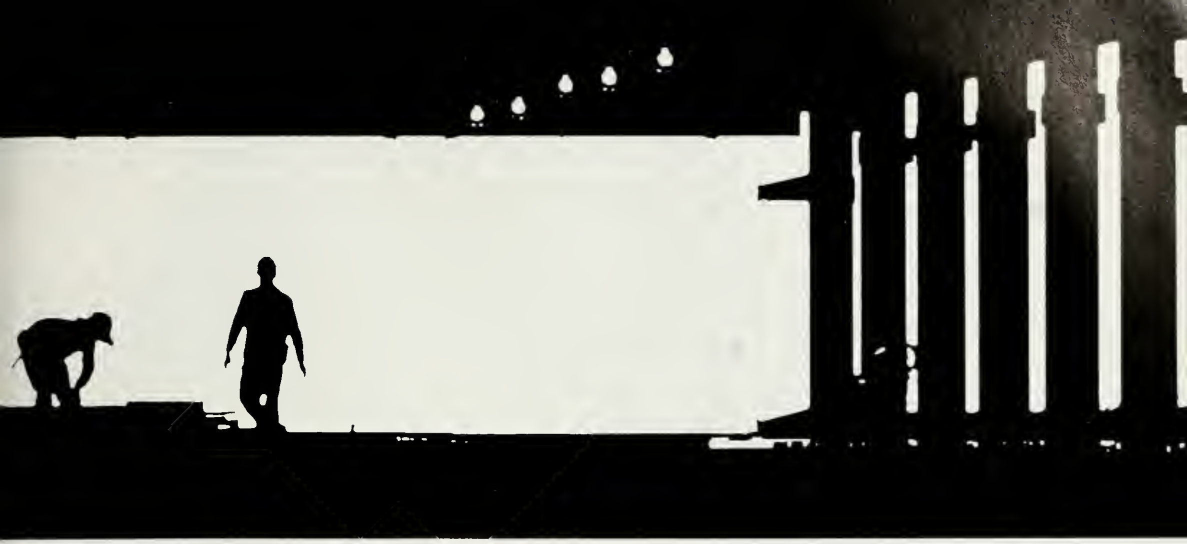
The network is, in every sense, a growing system.

For example, the millimeter waveguide transmission system which is now undergoing tests in New Jersey, will handle over 200,000 simultaneous calls. It is the sort of capacity that will be needed on heavily trafficked routes. However, our largest transmission systems today accommodate some 32,000 simultaneous calls. The obvious requirement, then, is a plan that will permit graduation to the higher capacity (a) without wasting the remaining usefulness of the lower capacity, (b) through an interface that will not overwhelm the lower capacity or underutilize the higher, and (c) at the right time and place for service.

Western Electric, working with Bell Telephone Laboratories, has undertaken the preliminary steps to expand production facilities for the waveguide systems, while Western engineers have begun to design the radically different machinery required for mass manufacture. All the while, of course, the state-of-the-art must be overseen to make sure that we are not investing capital in a system that might be made obsolete through the discovery of more sophisticated and more economical methods or devices.

Research has always furnished us with excellent conceptions to draw upon in the realm of technology—laser transmission, holography and fiber optics are a few of its more recent and popular products. But it takes time and talent to translate an idea into something practical, so that we have to be careful in choosing which ones to work on. There comes a time when we have to decide when to freeze a design. If the decision is made too early, our engineers lose the opportunity to incorporate the latest refinements. If it is made too late, the project itself might be delayed to such an extent that necessary services would be in jeopardy, with the added likelihood of wasted money and effort.

The second step of planning involves choosing a suitable course of action to implement the plan in concert with a series of other plans. For example, we must synthesize elements like the number and location of switching centers, cable and radio relay routes, toll switchboard arrangements, the offering of new



services, and the expansion and sophistication of other services, such as mobile telephone and wideband data.

Implementation planning is generally devoted to short-range efforts. The construction budget is the vehicle for implementation, and it covers a three-year time frame.

The construction budget must balance several factors—the service expectations of our customers; the earnings which must pay the cost of providing that service; the availability of capital and materials; and the impact of new technology.

In any single year, there are a multitude of separate projects in the Bell System's construction budget, each one individually engineered, reviewed and approved by the operating company involved. As might be expected, the major projects are matched against the system's long-range plan for continuity and compatibility, as established in concurrence with AT&T.

The associated telephone companies (including the Long Lines department) each prepares and approves its own construction budget in two phases that seem distinct but that are actually lock-stepped.

Each project is treated individually.

The engineering manager surveys the present technology to estimate the level of performance that can be provided at various costs. Deferrable or optional projects are subject to economic studies that consider the time value of money and the likely impact of these projects on overall corporate results.

While the plant extension engineers of the operating companies occupy themselves with the service and cost attractiveness of a range of technologies, the senior officers consider the company's financial condition and its earnings prospects to determine the degree of construction effort the company can afford to undertake. Once determined, the expenditure is recommended to the Boards of Directors of the associated companies for approval.

Once the companies have prepared their construction budgets, they are summarized and sent to AT&T. There the budgets are blended to form a Bell System construction budget. The advantage we gain is that the individual budgets are geared to local needs, while evaluation at the national level insures overall compatibility with financial and manufacturing plans.

In summary, our capital spending for construction has one aim in view: Furnishing telephone service that constantly improves in usefulness and value, at a cost to the customer that is as low as possible and that keeps the business financially healthy and attractive to investors. Although the construction budget process is complex and detailed, it will always undergo a thorough review by all levels of management. Examination of each component, analysis of accomplishments, dollars and materials, plus evaluation of major segments, are all considered prior to making the actual expenditures.

The 1973 capital budget is big. Subsequent years' expenditures loom even larger. Funding such budgets presents two major problems: Raising capital externally in the amounts projected becomes increasingly more difficult as our needs accelerate faster than the general economy, and as our earnings requirements increase. At the same time ways of generating more capital internally must be sought. Both will require management to utilize astute judgement in making the crucial decisions that affect this capital-intensive, service-oriented business.

Mr. Kertz is Vice President of the Construction Plans Department which he has headed since April 1970.

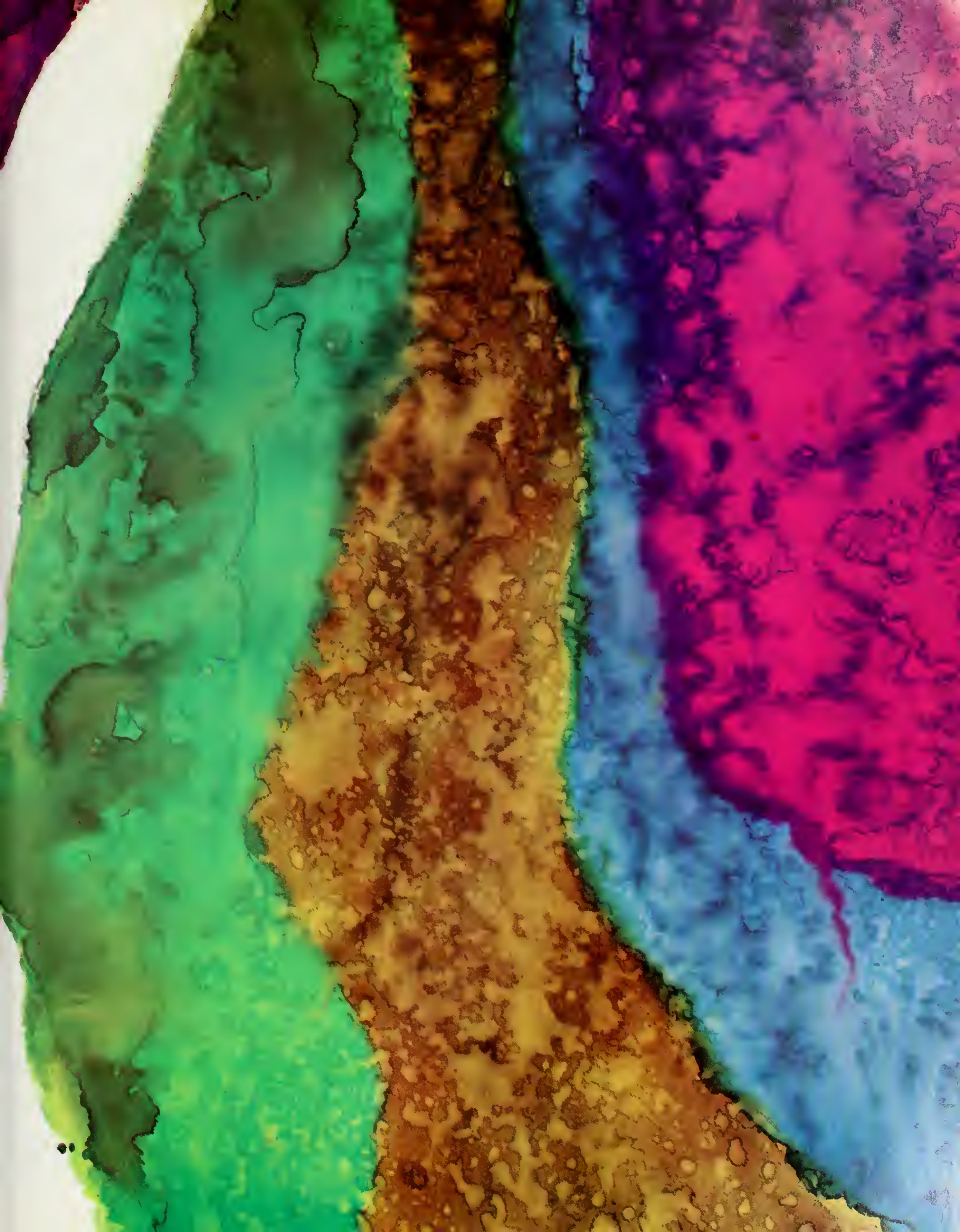
The Healing Art: A New Dimension

How a central computer and the telephone network help Sloan-Kettering provide the latest in radiation therapy to hospitals across the nation.

From the earliest days of radiation treatment for cancer, accuracy of the dosage has been literally the most vitally important element in radiation therapy. All human tissue, healthy as well as diseased, can be damaged by exposure to radioactive particles. Because the radiologist's primary goal is to deliver maximum effective radiation to a malignant tumor with the minimum possible exposure of the surrounding normal tissues, treatment must be planned with extreme care if the tumor is to be destroyed without damaging the patient as well.

Steady advances in the art of high-voltage therapy—related to but far from the early days of radium—with electrons, high-energy X-rays or cobalt-60 gamma rays, have produced ever more complex and costly machines and have demanded ever higher levels of technical expertise for their application. But radiation therapy, properly employed, has saved many lives and will save many more. Making the most of

Diagnostic X-ray locates tumor precisely.



this now indispensable weapon to fight one of man's most dreaded afflictions has for many years been the mission of Memorial Hospital in New York. There, and in the adjoining Sloan-Kettering Institute for Cancer Research, is concentrated the country's largest staff of experts in radiation treatment for cancer. The Memorial Sloan-Kettering Cancer Center, through constant research, has developed refined methods of treatment and is figuratively the Mecca for radiation therapy in the nation.

Obviously, not all the nation's people who need such treatment can possibly go to Memorial in New York. So, over the last decade, radiologists and physicists there have developed a system which, in effect, sends the benefits of Memorial's knowledge and facilities out to local hospitals where they can be applied in treatment. The system consists of a central computer accessed by telephone line links to the various hospitals, where teletypewriter terminals perform the sending and receiving function. There are now about 70 member hospitals in the network, in almost every state; membership is granted by a medical board at Memorial which ensures that applicants meet certain qualifications. They must, for example, have at least one full-time radio therapist on their staffs and adequate support in medical physics.

The computer: a powerful tool, fast and accurate

A member hospital feeds information via teletypewriter to Memorial's central computer (in Paramus, N.J.) on a patient's body contours, internal anatomy, the type of radiation energy to be used in treatment, precise location of the tumor, and so forth. The computer sends back a printout telling how the radiation beam should be directed, where it will be most intense and how it will affect surrounding tissues. The computer does in minutes what it would take a physician a day to do. The Memorial dose distribution computation service system has been designed for use by persons who have had no previous computer experience. Memorial's medical physics staff provides follow-up consultations, often by telephone, and keeps users informed of any changes resulting from the continuing effort to improve the system.

The computation service, like any other computerized system, has its limitations. Garrett Holt, associate attending physicist at Memorial who has been instrumental in developing the program, cautions that computer-calculated dosages don't automatically guarantee good radiation therapy. "The validity of the information we send out," he says, "depends on precise calibration of the radiation source and on proper diagnosis at the user-hospital end. In other words, the output from our computer programs here is only as useful and accurate as the input asking it what to do." To help ensure accuracy, Memorial brings the radiology staffs of member hospitals to New York for training, which includes formal lectures on the use of computerized treatment planning, its limitations, practical applications and the responsibilities of the users. The student staffs also get supervised instruction and actual application of principles in working with examples.

Memorial itself, says Holt, is the largest user of its own time-shared computer programs, treating about 3,000 patients a year. As many as 200 patients a day are examined there, of whom about 20 per cent receive individually designed treatment plans—depending on the judgment of the examining physician. If such treatment planning is indicated, the medical physics department is called in for consultation. The patient goes through a series of radiological examinations to determine as accurately as possible the exact location of the tumor and all of the patient's dimensions. From

Preparing patient for cobalt radiation therapy at Memorial Hospital, New York.

these examinations, a radiotherapist states the dose requirements and such vital details as areas to be excluded from radiation. The medical physics staff then designs the treatment plan by means of a computer program to give the therapist what he wants; he examines the resulting printout and develops the prescription.

Holt emphasizes accuracy as well as speed among the advantages of computer-calculated treatment. "The computer is such a powerful tool," he says. "We can use it to optimize a treatment plan for best dosage, and can shift parameters around until we get closest to the intent of the radiotherapist attending the patient. If such treatment calculation were done by hand, we'd have to be satisfied, as we used to be, with much cruder results. But the computer, working so fast, can refine the calculations in very little time, and by averaging can give us a spread from which the optimum choice can be made."

Intelligent terminals and neutrons

In addition to continually updating the central computer programs as new knowledge becomes available, the medical physics department at Memorial, always at the frontier of research in its field, is experimenting with the minicomputer as an "intelligent terminal" in place of the teletypewriter. With a cathode ray tube as an adjunct, the mini can produce rapid graphic displays—in three-dimensional representations, if necessary – and can interact with the central machine much faster than the teletypewriter. Also under experiment are new sources of radiation: such exotic sub-atomic particles, for example, as neutrons produced by a radioactive isotope supplied by the Atomic Energy Commission at $35,000 per microgram. Obviously, not many hospitals or laboratories can afford to experiment at that level of expense.

The whole purpose of the system, says Holt, is to enable large, centralized institutions such as Memorial Sloan-Kettering, with all its facilities and staff, to help small, outlying institutions with state-of-the-art therapy. Such computerized methods, he says, are now in use all over the world, many of them in Europe. "But," he adds, "they are feasible only in areas where they have an extensive, up-to-date communications network." Similar time-shared computer systems are being tried at Dartmouth and UCLA, all aiming at computerized treatment planning via phone lines, but Memorial was the first with a working system and is by far the largest.

Flexibility of network arrangements is also a feature of the system. In New Jersey, for instance, 21 hospitals have recently joined the Memorial Dose Distribution Computation Service. Only 14 of them, however, link directly to Memorial's computer system. These hospitals have full-time radiation therapists, as required by Memorial, and full-time, or at least half-time, physicists on their staffs. The seven other hospitals, which don't presently have such staffs, are linked to the primary group by telecopier. This allows them to tap the computer indirectly by relaying input information to a hospital having a direct link to Memorial; the output returns by the same route.

Every possible precaution is taken, says Holt, to eliminate mistakes which, in dealing with radiation, could be dangerous or even fatal. "If a user has a problem with his dosage calculation," he says, "we can display his input data, edit it and discuss it by phone. The users of the system are human, after all, and can make such simple slips as substituting a capital I for the numeral 1—a small thing, but enough to make the program bomb out. The system itself, of course, is programmed to detect most errors in the data being processed."

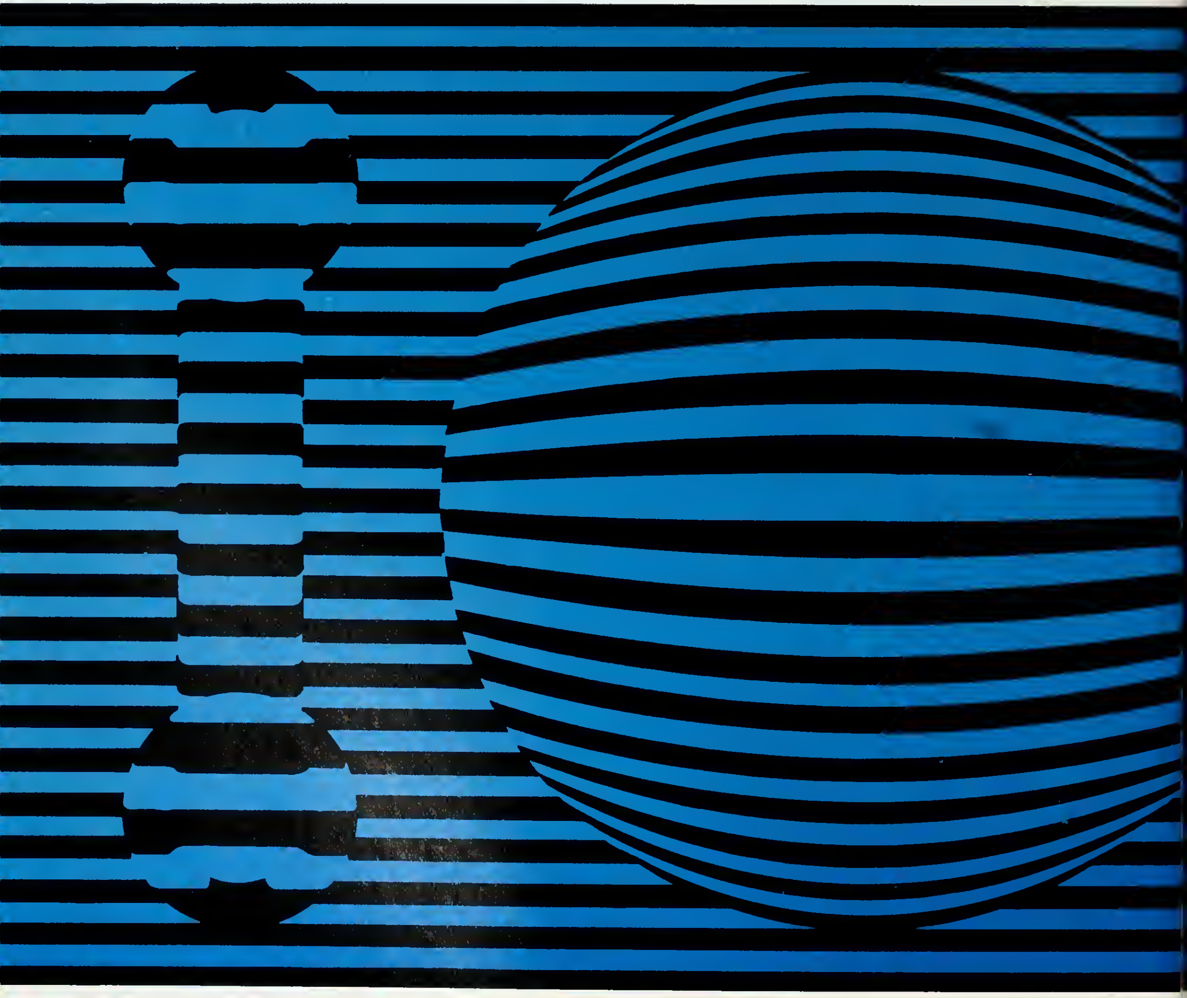
The distribution computation service has benefited from frequent consultation with its members. Recently the staff of Memorial held a workshop session in Chicago during which problems and information were pooled. Memorial also issues a periodical newsletter to all member hospitals in the network.

The software grows

Naturally, as the art of radiation therapy has grown in knowledge and technology, the software – computer programs for Memorial's system—have grown with it. The hospital now has a professional computer programmer on hand full time. "And," adds Holt, "I see several programming man-years ahead." He estimates that Memorial now enables treatment planning, via its network, for about as many patients per year in remote places as are treated in New York. At the rate the number of member hospitals is growing—about 40 were added during the last year—the ratio of remote to in-house patients may well climb in another year above the even mark. And it is the communications network that has made possible transmission of centralized expertise from the largest cancer treatment center to the farthest corners of the country.

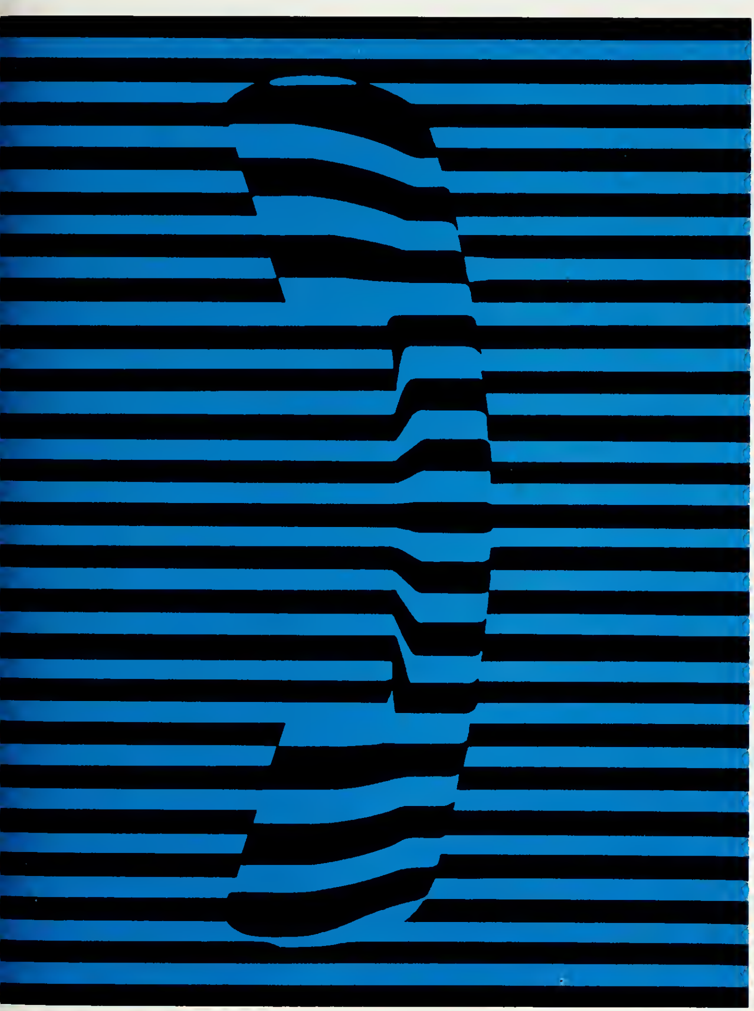
Don Woodford, Managing Editor

]



Success Story

International Direct Distance Dialing appears to be fulfilling its impressive potential



Peter Burbank leaned forward in his office chair, picked a letter from a pile of correspondence on a half-circle desk, and read some handwritten notes in the margin. He then turned to his telephone, and dialed fourteen digits.

A light winter's rain streaked the windows of New York City's World Trade Center where the shipping concern of A. L. Burbank and Company has offices on the 28th floor of the north tower.

"Guten Tag. Herr Doktor Kramer bitte," Burbank said to a secretary in Hamburg, Germany. It was that easy—"Good day. Doctor Kramer, please"—a matter of seconds.

Burbank, president of the firm, has had international direct distance dialing (IDDD) service from his telephone exchange for more than a year. He's happy with it, and that's a typical reaction from the Bell System's telephone customers who have the service.

Currently, about a dozen communities—including New York, Washington, and Atlanta—have IDDD service on certain telephone exchanges, which are capable of reaching up to 20 countries abroad. By the end of this year, most major cities will have some switching facilities which will permit the introduction of IDDD for a limited number of customers. Consideration of call volumes, switching equipment, customer location and instruction, local economics, and other factors, will be examined by the Associated Companies to decide in concert with Long Lines upon the date for implementation in any given area.

IDDD will be gradually introduced around the nation.

An interdepartmental, AT&T team of Engineering, Traffic, Commercial, Comptrollers, Public Relations, and Plant, with Bell Labs participation, has been working with Long Lines to help the associated companies introduce IDDD.

According to R. A. Newman, Long Lines director of overseas network operations, "By 1976, it's expected that about a quarter of the Bell System's customers could have access to IDDD facilities with a minimum of investment on the part of their local phone company."

Surveys show call growth

Overseas direct dialing by customers has thus far been a success story both in the United States and abroad. Studies have shown there has been a marked increase in calls to the United States from the countries that have embarked on the service; Long Lines records indicate that 35 per cent of incoming overseas calls are now dialed in this fashion. Eight European nations and Israel have direct customer dialing to this country.

A five-month study of overseas calls originating in New York City during 1971 indicated that, for customers with IDDD service, the number of calls to countries capable of being dialed direct increased 35 per cent. During that same period, calls from the rest of the Bell System's customers to the same countries increased 10 per cent.

"Another thing to keep in mind," Newman says, "is that customers who dial their own calls overseas tell us they're happy about the power to initiate these calls anytime they feel like it, and they're pleased about having full control over the call's completion. In addition, they like the vastly improved speed of service—calls take seconds to complete, not minutes."

It's still too early to make a firm estimate about what kind of economic or service effect customer dialed calls to overseas points will have on the telephone business, but the potential is big. Last year, about 40 million overseas messages to or from the United States were handled by Long Lines. The volume has been expanding at a rate of more than 20 per cent a year, and this pace is expected to continue or even increase. Current projections estimate that 200 million calls annually will be made to or from this country by the close of the decade.

"During the late '70s and beyond," Newman says, "it's quite possible that IDDD will have expanded to a point where most of the people who make overseas calls could have an IDDD exchange at their disposal. Of course, a lot depends on long-run customer acceptance of the service and other variables.

"It seems to me that we're on the threshold of fulfilling the dream included in the certificate of incorporation for the American Telephone and Telegraph Company. That document, written in 1885, was a broad claim of intent to establish phone communication throughout this country, and to connect these phones '*by cable and other appropriate means with the rest of the known world*.' In my opinion, IDDD carries that vision to its ultimate conclusion."

In 1885, there were fewer than 150,000 telephones in this country. Today, there are about 120 million, and the world total is estimated to be 300 million. Obviously, the job of putting the known world literally seconds away is a complicated task.

One of the first steps in this direction was the establishment of a worldwide numbering plan for telephones about 10 years ago. At that time, communications experts from 68 countries, under the auspices of the International Telecommunications Union, developed a plan calling for the elimination of telephone numbers that combined letters and numerals. Some countries don't have the same letters on their dials: The Danish phone, for example, has no "J," "Q," "W," or "Z," and the U.S. phone has neither "Q" nor "Z." This was not expected to represent a major upheaval since more than 85 per cent of the phones outside the United States already had an all-numeral dialing system and about half of this nation's telephones used only numerals.

The other main outcome of that meeting was the establishment of nine numbering zones covering the globe. Like the all-number-dialing plan, this was done with IDDD in mind because for automatic service no two numbers in the world can be the same.

Today, this means that someone calling from the World Trade Center to Hamburg, for example, would dial the international access code (011); country code (49); routing code (411); and then the local number.

Generally speaking, the introduction of overseas direct dialing has followed the same evolutionary path that direct distance dialing (DDD) followed domestically a few years ago. Both required the formulation and implementation of routing and numbering systems; the initial phases were limited to operator dialing, while the complexities of customer dialing were confronted later.

Third anniversary in April

Operator dialing of toll calls began just before the '30s; customer dialed long distance calls on the domestic front had their beginning in 1951. It was in March 1963, just about 10 years ago, that operator dialed overseas calls were initiated between the United States, England, France, and West Germany; IDDD service started in April 1970, just seven years later.

The continued increase in the number of high quality cable and satellite circuits, plus a trend toward decreasing overseas toll rates, have resulted in a kind of overseas boom. Annual growth rates have exceeded 25 per cent for many years, resulting in a large expansion in the need for overseas operating centers. A multi-million dollar center opened last year in Denver, for example, and another is scheduled for service later this year in Springfield, Mass. The expansion of IDDD service is expected to curtail the need for construction of similar facilities in the near future.

ESS increases capability

The current expansion of IDDD resulted from new technology. When overseas calling by customers was first introduced in New York, a few electromechanical offices were modified. This was an expensive project requiring a lot of new capital.

With the introduction of electronic switching systems (ESS), the provision of IDDD service was a matter of programming. When a new ESS program is written, it includes a variety of new service features, IDDD among them. It is then introduced in a relatively short time in all ESS offices.

The generic program that provides IDDD is known as CTX-4. This program, of course, provides other features of value. The first ESS office fitted with an IDDD program was the Varick Street office in New York. On October 1, 1971 it started processing calls for the New York Telephone Company's World Trade Center customers.

Nearly all new ESS offices cut into service since October, 1971, are equipped for IDDD; and many older ESS offices have been fitted for global phoning. As of mid-September, 1972, more than 180 of the almost 290 existing ESS offices were capable of offering IDDD. By 1974, most of the remainder will be so equipped and, of course, all future offices will have this capability.

TSPS promises wider use

Another technological innovation brightening the prospects of U.S. customers making international calls is a scheduled change in the program of the traffic service position system (TSPS).

In the fourth quarter of 1974 a new TSPS program will permit TSPS operators to process overseas assistance calls. Also, it will permit customers served by step-by-step offices to have IDDD service with no added investment in equipment. It will reduce the cost of modifying No. 5 crossbar switching offices for IDDD, and, at the same time, it will permit customer dialing of person, credit card, collect and pay-station calls. As a result of these changes, the year 1975 should see IDDD capability expanded to about 25 per cent of the System's customers, and most of these customers will be able to dial both station and person calls.

Meanwhile, for the people at A. L. Burbank and Company, one of the three major shipbuilder-brokerage firms in the world, IDDD has meant a savings of time in making their 200 overseas calls a month.

For Peter Burbank, it has meant that and more.

"Oh, I appreciate the speed and efficiency of it all—I really do. But what I miss most about the whole operation is that when I get home, I can't dial overseas myself anymore. Because of the world's time differences, sometimes it's more convenient for me to call from my house. It's then that I realize how much I miss IDDD, and how fast I grew used to it. I really wish we had this service at our home."

Someday soon that wish will probably come true.

Richard Burke, who wrote this article, is an information supervisor at Long Lines Headquarters in New York.

Global IDDD challenge: Of 300 million world phones just one should answer when you dial

Part of the challenge of creating an IDDD network was in making certain that every customer would have a different telephone number, and converting various dialing systems to universal compatibility.

The International Telecommunications Union, an agency of the United Nations specializing in global communications, estimated how many phones would be in service by the year 2000; then it sectioned the world into nine "world numbering zones" in similar fashion to the area codes in this country. (For instance, the United States is in Zone "1".) In that way, the additional prefix of numerals insured that no phone in the world would have a duplicate number anywhere else.

Getting switching machines around the world to communicate with each other is a trickier problem. For instance, there are more than a couple of machine "languages" just in North America to transmit information about the number being called.

And there are other concerns. The dials in Sweden start with zero and run through nine; this means that when a person in Stockholm dials the number six, he or she sends out seven clicks, since it's the seventh digit on the dial. Sweden has an international communications office that converts everything into the standard, global codes and, as a result, Sweden is in the IDDD network.

But sometimes the problems of global phoning are quite troublesome. Not all countries place their letters of the alphabet in order on their phones, for example. A customer dialing from a phone with one set of letters can find it impossible to reach a phone in a country with a different arrangement. However, it's believed that a universal system of all number dials would solve such problems. How far in the future a system like this will be implemented is difficult to say. ☐

THE SPANISH SURNAMED: A REPORT IN TWO PARTS

America's Spanish-Speaking: A Profile

by Henry M. Ramirez
Chairman, Cabinet Committee
Opportunities for Spanish-Speaking

Part I

Who are the Spanish-speaking?

Paradoxically, all of them do not speak Spanish. Some speak only Spanish, others only English, and many speak both languages.

Racially, the Spanish-speaking include white people, brown people, and black people. Though they or their ancestors came from Mexico or Puerto Rico for the most part, many originated in Cuba or one of the Central or South American republics.

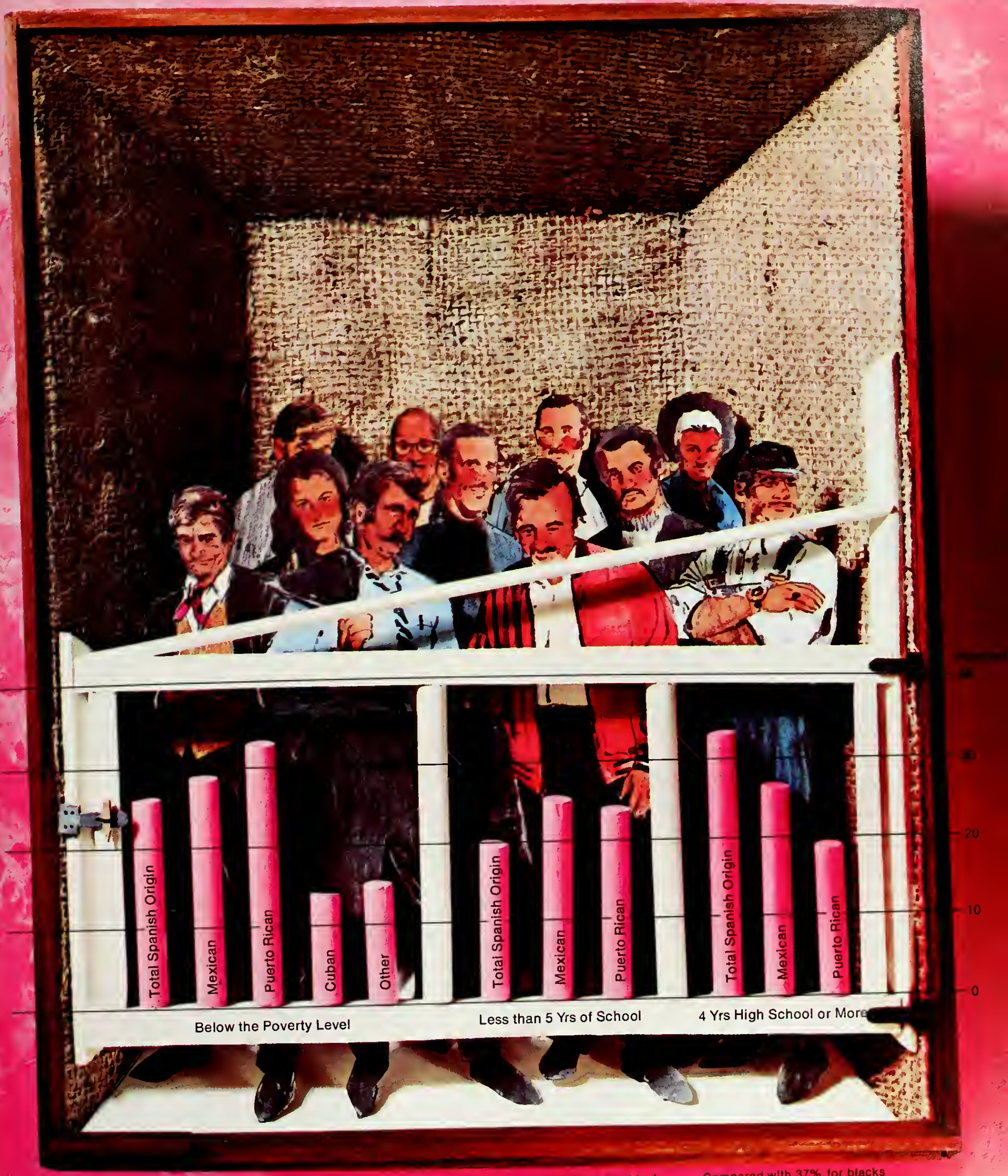
The main common denominator is a Spanish language heritage. Beyond that they may differ greatly. In microcosm, they are a melting pot—and like the greater U.S. melting pot, the melting is far from complete.

They are in every State in the Union, and, according to the latest census, 31 States have Spanish-speaking populations of at least 20,000.

They represent roughly five percent of the U.S. population, making them our second largest minority group. Physicians, dentists, lawyers, and prosperous businessmen are numbered among the Spanish-speaking, but far too many are poorly paid laborers.

Despite their numbers, the Spanish-speaking have only recently begun to capture the attention of the general public. The national news media during the past decade have become aware of this significant minority, but have continued to reinforce a mixed-to-negative picture of the Spanish-speaking as rural, lazy, sinister, illiterate, and culturally disadvantaged. The Spanish-speaking resent these stereotypes. Though they have dwelled in territory now part of the U.S. for centuries, they are too often regarded as interlopers and not part of the American mainstream.

In general, Spanish-speaking Americans are severely disadvantaged compared with the dominant Anglo population. In income, occupational status, and unemployment, their status is roughly equivalent to blacks; in education they are far worse off. Discrimination against them remains a major obstacle to



Compared with 34% for blacks and 13% for all Americans

Compared with 12% for blacks and 5% for all Americans

Compared with 37% for blacks and 59% for all Americans their social and economic progress, particularly for poor Chicanos and Puerto Ricans. Lack of English facility and other cultural differences, including a partially self-imposed ethnic isolation common to earlier generations of immigrants, leave a great many Spanish-surnamed people outside the mainstream of economic opportunity.

There is considerable controversy over the actual number of Spanish-speaking people in the U.S. Official census figures place the number at more than 10 million in 1970. Nearly three-fifths are of Mexican origin and about one-sixth are Puerto Ricans (not counting the 2.7 million in the Commonwealth of Puerto Rico). But information from local census studies, migrant studies, public school enrollments, the Cuban resettlement program, and other data suggests that the real total may be substantially higher. Informal estimates of some Spanish-speaking spokesmen range up to 16 million.

Spanish-speaking population has increased

Since World War II, the number of Spanish-speaking have substantially increased, and they have tended to move from the country to the city and to disperse throughout the U.S. Although there are still large concentrations in certain areas, 46 U.S. cities now have Spanish-speaking populations of 10,000 or more.

The areas with the highest concentrations of the Spanish-speaking are:

- The Southwestern States of Arizona, California, Colorado, New Mexico, and Texas, where the overwhelming majority of Mexican Americans and 3 out of 5 Spanish-speaking Americans are located.
- New York City, where 8 out of 10 of the Puerto Ricans living in the continental United States reside.
- Florida, where large numbers of the more than 600,000 persons of Cuban descent have settled along with many immigrants from Central and South America.

This leaves roughly two million Spanish-speaking persons who live elsewhere in the nation.

The Spanish-speaking today have a new-found sense of group identity evolving around a common language heritage and similar cultural values. But this should not be permitted to obscure the important differences within this ethnic group.

For the sake of brevity — and at the risk of oversimplifying—let us look at these differences. Mexican Americans are the largest subgroup. Most of them were born in the U.S. and large numbers are ill-educated and otherwise disadvantaged. Except for New Mexico and a few locales in California and Texas, they have not reached positions of economic or political power.

The Puerto Ricans, the second largest group, reside primarily in the Northeast, especially New York City. A majority have arrived in recent years. By income, unemployment, education, and similar measures, they are the most severely disadvantaged of the Spanish-speaking. Puerto Ricans have attained little economic or political leverage.

Cubans and South Americans better off

Almost all the Cubans in the U.S. are foreign born. They entered this country in large numbers in the past 14 years, thanks in part to the excellent Cuban resettlement program, and they are concentrated primarily in the Miami area. Many possess job skills and a profession.

People of Central and South American extraction and other persons of Spanish origin are a large and diverse group, making up about one-fifth of the Spanish-speaking population. Most were born in the U.S. and about half live in the Southwest. They tend to represent a relative economic and social elite, with higher incomes, better jobs, and more education than other Spanish-speaking groups, even Cubans.

Income is the best single determinant of economic and social status. Census figures for 1971 emphasize the difference between the Spanish groups, and their inferior position as a whole to the rest of the United States. Median family income in 1971 was $7,548 for Spanish-speaking and $10,285 for all Americans. Puerto Ricans were by far the worst off, with median family income of $6,185, more than $200 below the level attained by black families.

Census figures show that some 29 percent of Mexican Americans and 32 percent of Puerto Ricans are below the poverty level. The comparable figure for all Americans is 13 percent and for blacks 34 percent. Clearly, the Spanish-speaking and particularly Mexican Americans and Puerto Ricans, are congregated along with blacks at the bottom of the economic ladder in terms of income (see page 19).

Most are in unskilled, low-paid jobs

The precarious economic position of the Spanish-speaking is further underscored by the nature of the jobs they hold. About 70 percent of them are in unskilled and low-paid blue-collar, service, and farm jobs. Only 23 percent of Spanish-surnamed men hold white-collar jobs, compared with 42 percent for all American males.

Being relegated to the bottom of the economic heap is a consequence of the educational deprivation suffered by the Spanish-speaking, as well as the discriminatory barriers they face along with other minorities. Persons of Spanish origin have a lower level of educational attainment than any other group in the population (see page 19). Only about one in five Puerto Ricans and one in four Mexican Americans 25 and older have completed high school. Only 12 percent of all Spanish-speaking Americans 25 and older have attended at least one year of college. For Mexican Americans and Puerto Ricans, the figures are four and six percent, respectively. The comparable rate for all adults is 21 percent.

Somewhat less measurable but no less real are the cultural differences between the Spanish-speaking and other Americans. The Spanish-speaking have a strong sense of cultural uniqueness, coupled with feelings akin to outrage that the broader society has failed to recognize, accept, or even place a positive value on their contribution to the diverse fabric of American society. To some extent these felt cultural differences result in part from the high proportion of the Spanish-surnamed living in poverty. In this sense, the Spanish-speaking have characteristics in common with blacks, Appalachian whites, or others living in the "poverty subculture."

There are, however, very real differences between disadvantaged Spanish-speaking people and other poor Americans – differences that affect the conduct and success of manpower and other social programs. These differences include language, value orientation, ethnic isolation, and other social and psychological factors.

Spanish is the most prevalent of all foreign languages in this country and the one with the highest likelihood of surviving here on a permanent basis. Mexican Americans and Puerto Ricans, unlike earlier waves of immigrants (though strictly speaking the latter arrive as citizens rather than immigrants), persist in using their language over several generations. Access to Spanish language mass media and entertainment permits this pattern to continue. Furthermore, the Spanish-speaking have fewer economic incentives to learn English because their opportunities to advance are limited and the acculturation pressures from children and the rest of society are less severe than in the past.

The result is that roughly one Spanish-surnamed adult in four is illiterate in English. Many lack a working command of Spanish as well as English. These language barriers and education problems go hand in hand; they feed upon and exacerbate one another. Efforts by manpower and education agencies to cope with language difficulties generally have been inadequate, both in quality and quantity, although in recent months there has been a commendable increase in emphasis on language training in manpower programs.

When it comes to a discussion of value orientations, the danger of stereotyping always is high. Value orientations often differ among the various groups of the Spanish-speaking, as well as between the Spanish-surnamed in general and other Americans. But some cultural attributes that seem to apply to most of the Spanish-speaking can be readily identified:

- Relations between individuals are more important than competitive, materialistic, or achievement norms.
- Strong family ties.
- A sense of solidarity and pride in a unique heritage (a feeling sometimes referred to as La Raza).
- Machismo, meaning male dominance, patriarchy, emphasis on man's masculinity.
- Aspirations for professional rather than business or managerial occupations.

Rural values in conflict with urban ways

To some extent these values reflect an older rural culture. As Spanish-speaking people move to the cities–80 percent now reside in urban areas–they tend to pick up Anglo values. The older values persist, however, and it would be unsafe to assume they will materially change in the present generation. Indeed, there is sharp disagreement within the Spanish-speaking community on the necessity and value of assimilation. Efforts at forcing assimilation, such as the practice of some Southwestern schools until recent years of forbidding children to speak Spanish, are generally recognized as unwise.

The basically rural background of the Spanish-speaking helps explain their ethnic isolation, an isolation more pronounced than that of earlier immigrants. Until World War II, they were congregated in rural areas and held farm jobs, while earlier generations of new Americans generally went to the cities where the pressures of the melting pot were greater. By the time the Spanish-speaking began to urbanize, their numbers were great enough and their subculture strong enough to survive these pressures.

The overwhelming majority of the Spanish-surnamed live in self-contained neighborhoods separated from the rest of the community. Sometimes, this represents a choice of the individual who feels more comfortable with people of his own culture. All too often, unfortunately, the reason can be found in economic or social discrimination which forces the individual to live in substandard housing. Such barrios are quite similar to black ghettos. Studies of metropolitan areas such as Los Angeles demonstrate that the chances of a Spanish-speaking person occupying sub-standard housing are over four times that for an Anglo at a similar income level.

As the Spanish-speaking develop the skills to help themselves, the majority community must make some adjustments in meeting their needs. This is particularly true of institutions providing training and education in an attempt to help the Spanish-surnamed improve their position in the economy.

Manpower policies and programs too often have failed to recognize and deal with the uniqueness of the manpower needs of the Spanish-speaking people. The decision makers often do not know enough about the language and cultural characteristics of the people to develop viable and effective programs. The fact that Hispanos speak a foreign language and have different backgrounds is regarded as being their own problem, and the need to establish programs built upon serving people from different cultures is not always recognized.

The Spanish-speaking want the opportunity to participate in society, to share, learn, and grow – as individuals and as a group. For many centuries, they have been a simple and docile people. This will no longer be true as we move into the 1980's. As Americans they expect to exercise their rights and responsibilities in the context of American society.

Reprinted courtesy of Manpower Magazine, *Department of Labor, Manpower Administration.*

Henry M. Ramirez was confirmed as Chairman of the Cabinet Committee on Opportunities for Spanish Speaking people in November, 1971. He holds a doctorate degree from Loyola University of Los Angeles and began his career as a language teacher. Prior to his current appointment, he was Director and Chief of the Mexican American Studies Division, U.S. Commission on Civil Rights.

The Spanish-Surnamed: A Bell System Perspective

Part II

The preceding article by Henry Ramirez outlines the difficulties faced by Spanish-surnamed Americans as they continue developing their place in the country's economic mainstream. To explore the steps the Bell System is taking to provide broader opportunities for members of this minority group, *Bell Telephone Magazine* interviewed Don Liebers, Personnel Director, Human Resources Development Department, AT&T. Here are excerpts from that interview:

Q. To get to the point, what is the Bell System doing to provide broader employment opportunities for Spanish-surnamed Americans?

A. The Bell System's policy is not to discriminate in the employment process. Our jobs are open to minority group members and that, of course, includes Spanish-surnamed Americans. Today, with the System-wide implementation of our model Affirmative Action Program, a systematic process has been set in motion which will insure equal opportunity for all applicants. The details of the approach are spelled out clearly in formal Affirmative Action Programs developed by all Bell System companies. The stated objective of these programs is to achieve an employee profile, with respect to race and sex, in each major job classification, which more or less resembles the relevant labor pool, and to achieve that goal within a reasonable period of time. In pursuing these objectives, Bell System companies will be looking specifically for qualified Spanish-surnamed Americans, as well as other minority group members, when they seek to fill job openings.

Q. How many Spanish-surnamed Americans now work for the Bell System?

A. As of June 30, 1972, approximately 24,500 Spanish-surnamed Americans were employed by the Bell System. This is about twice the number that were on our payroll in December, 1968. However, I don't want to mislead you. While 24,000 is an impressive sounding number, it represents slightly more than two per cent of the total Bell System work force. Based on national statistics, Spanish-surnamed Americans make up nearly five per cent of the population, so you can see we still have a way to go.

Q. Can we meet our goals and timetables for the employment of Spanish-surnamed Americans?

A. We have much to learn about implementing and achieving consistent success in that market. While achieving significant gains in one geographic area, we may be lagging in another. We have not been as successful at recruiting Spanish-surnamed Americans as we would like, but I would like to stress that we are making gains and hope to make even greater progress.

Q. Aren't there agencies that specialize and assist in such recruiting?

A. While there are no employment agencies to assist in recruiting Spanish-surnamed Americans in the strict sense of the word, there is one national organization which should be mentioned. It is Jobs For Progress, Inc., popularly known as SER, an acronym for "Service, Employment, Redevelop-

"You'll find that minorities are leery of people who want to give them things. Especially if it is a 'goodie.' They know there's a catch someplace. When we offered to pay people while we trained them and taught them some basic English, we made it very plain that we wanted them to give us good and honest work in return. They understood and performed accordingly."

Millie Torres,
training center administrator,
New York Telephone

"When we first began Servicio Amigo, a program to help Spanish-speaking customers who spoke little or no English, we got all kinds of calls for help. An old woman might arrive from Mexico by bus and not find anyone at the depot to meet her. She'd be looking for an Enrique Lopez. There are probably a hundred listings for Lopez, but none for Enrique and she'd have no idea where he lived. We'd start down the list. It might take us an hour before we'd find someone who knew how to reach Enrique, but we were usually very lucky."

Miss Juanita Martinez,
service representative,
Servicio Amigo,
Illinois Bell

ment." SER is the only national manpower delivery system for the Spanish-speaking. All SER programs are staffed by bilingual personnel and the organization builds its programs around certain basic services—counseling, job preparation training, institutional skills training, on-the-job training, job placement and follow-up.

The National Puerto Rican Forum in New York provides similar services to Puerto Ricans and there are other regional groups serving people who live in specific areas.

Q. In addition to working with these agencies what else is the Bell System doing?

A. Recently, we have sponsored conferences attended by Equal Employment Opportunity staff members from those Bell System companies which have high-density populations of Spanish-speaking people. The first conference was held in Albuquerque, New Mexico, and it addressed itself to the problems faced by Mexican Americans in the Southwest. A similar conference was held in New York City in November, 1972, and identified some of the pressing problems faced by the Puerto Ricans and Cubans entering the labor market. The conferees indicated that these meetings had created a greater awareness of the problems and provided them with a stronger determination to evolve more effective recruiting programs. I am making my staff available to the companies involved for the necessary follow-up.

Q. Can we do anything for Spanish-surnamed people who have potential skill but lack proficiency in English?

A. Yes. Let me give you an example. New York Telephone Company experimented with a program to teach "English as a Second Language" to a pilot group of 20 persons. It was a federally funded project developed by the National Puerto Rican Forum. In addition to normal basic job training, the company provided 120 hours of classroom instruction devoted to improving basic knowledge of the English language. While the initial group was small, the experience gained will be invaluable in the years to come and will assist in streamlining

"A co-worker once said to me, 'Mike if only all Puerto Ricans were decent like you, your people wouldn't have such a bad name.' I was deeply offended. All the Puerto Ricans I know are like me. I asked him how he was able to form such a bad opinion of an entire people. Had he done a lot of research on the subject? It turned out I was only one of a very few Puerto Ricans he had ever talked with in his life."

Mike Rivera,
supervisor-training,
Management Training Center,
New York Telephone

"I worked for the Cuban Power and Light Company and helped overthrow the Batista regime. I soon became disillusioned with Castro and applied to leave the country. It took 3 years. I was forced to resign my job and work in the cane fields while my application was processed. I'm grateful I was given a chance here to follow the strong interest I've always had in electronics."

Bernardo F. Quintana,
switchman,
Southern Bell

similar future programs. Pacific Telephone also experimented with similar programs.

Q. What impact do cost/earnings levels have on the implementation of Affirmative Action Programs?

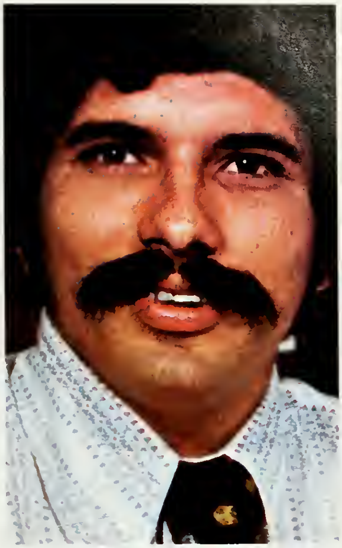
A. Let me cite a specific case. More than three million Mexican Americans make their homes in California. This represents nearly 16 per cent of the State's population and the highest concentration of Spanish-surnamed Americans anywhere in the country.

At Pacific Telephone's annual meeting last March, Pacific's President Jerome Hull told share owners that one of the company's highest priorities in the years ahead will be to increase sharply the number of Spanish-surnamed employees on the company's payroll. He said 20 to 25 percent of all new hires each year, and 25 to 30 per cent of the company's college hires for the next several years, will be from among the Spanish-surnamed.

A couple of months later, the California Supreme Court rejected a previously authorized rate increase and ordered Pacific to reduce rates and refund monies previously collected. The company had no choice but to reduce its hiring and limit promotions. Pacific said its commitment to minority employment hasn't changed. It will continue its employment in the same relative proportions, but of necessity the numbers of hires and promotions overall will be smaller.

Q. How would you characterize the progress being made?

A. I think the Bell System is making progress. As with any program, there are always some instances where things don't move as quickly as you would like. However, as a nation-wide company, the Bell System continues to lead the way in providing equal employment opportunities through the implementation of its Affirmative Action Program and its Upgrade and Transfer Plan. We are not just *talking* about affirmative action; we are *committed* to it wholeheartedly and have implemented the measures that will assure its achievement. In short, we have done much, but still have much to do. ☐



"My parents came to the United States from Puerto Rico and until I went to school the only language I spoke was Spanish. Now I hold a degree in Mechanical Engineering from Virginia Polytechnic Institute. I get very upset with people willing to accept the status quo. I am very active politically and can't understand why the bulk of my fellow employees are not more involved."

Terry Torres,
assistant engineer,
Southern Bell

THE NEW SAFETY FACTOR

Bell System Safety Administrators are fond of pointing out that the very first telephone call was one involving an employee injury report. Mr. Bell had spilled some battery acid on himself, and the call was, of course, "Mr. Watson, come here. I want you." Presumably Watson arrived in time to render whatever assistance or first aid may have been necessary, since there is no record of a disabling accident in company statistics for the year 1876. Still, and tongue in cheek, the Safety people declare, "There's nothing like having an accident happen to the top man to convince upper management of the importance of safety programs."

Who's to say? For whatever the reasons, upper management in the Bell System has always had a keen interest in safety. What other company, for example, casts in bronze and prominently displays the creed, "No job is so important and no service is so urgent that we cannot take time to perform our work safely." That slogan has been around since the 1930's.

Copied by other companies

But our reputation is not built on slogans. As a pioneer in the field of industrial safety, the Bell System's contributions are both widely known and highly respected. Over the years, the company has introduced a variety of programs designed to meet specific safety objectives. Many worked so well that they were eagerly duplicated and widely used by other companies. A company-originated First Aid Training Course, for example, forms the core of similar material now distributed under the seal of the American Red Cross.

In December, 1972, AT&T took another step forward in its continuing battle to reduce the number of accidents befalling Bell System people. It released to all operating companies, Long Lines, Western Electric and Bell Laboratories details of a new program called the *Bell System Accident Prevention Plan.* As its title implies, the new program concentrates on properly training people to avoid faulty work practices and to recognize and correct unsafe conditions to keep accidents from occurring.

Federal involvement

There are two strong reasons for issuing such a plan. First, despite our best efforts, the Bell System's safety record is not as good as it could be. The upward trend in disabling job injuries which began in 1969 cannot be ignored. The rise in on-the-job fatalities is equally alarming. As of Dec. 1, 21 Bell System employees had lost their lives in on-the-job accidents; thus, 1972 threatens to match or exceed the grim record high of 22 Bell System fatalities in 1971.

Second, in December, 1970, the Federal Occupational Safety and Health Act became law. Under provisions of "OSHA," companies are now required by law to comply with certain safety and health standards. The standards are quite technical and specific and make the corporation responsible for seeing that employees know how to perform their work safely. The new Accident Prevention Plan specifically covers safety training.

OSHA requires employers to furnish a place of employment free from recognized hazards that are likely to cause death or serious physical harm to employees and to comply with standards promulgated under the act. The act is aimed primarily at high-risk industries and employers who have meager or no safety programs. The Bell System has historically had one of the best safety records and one of the most highly developed safety programs in industry. Where OSHA sets standards, in most cases, the Bell System has long had standards that match or exceed the guidelines directed.

The Hands-On Method

OSHA implementation and the Bell System's internal safety efforts are aimed towards the same goal—reducing and eliminating accidents and their causes. The law concentrates heavily on correcting unhealthy environments and poorly designed or maintained work equipment; the Accident Prevention Plan concentrates on training to do the job safely.

Using the "hands-on" review and training technique, the Bell System Accident Prevention Plan attempts to correct shortcomings in basic safety knowledge, a primary cause of work injuries.

What is meant by the hands-on technique? Well, back in the old days, before training was formalized, a foreman might ask a fledgling lineman if he had any experience. If the man said "Yes," the foreman might reply, "Okay, let me see you climb that pole." By observing the neophyte's attempt, the foreman learned just how much the man already knew and what he had to be taught. The new man was then given the appropriate instruction by the foreman or another more experienced craftsman. After being shown the proper way to do the task, he was told to demonstrate what he had learned. If he failed to perform correctly, he did it again, and still another time, if necessary, until his boss was satisfied. This was hands-on training at the very basic level.

As our company grew larger and

the work force grew with it, training, including safety training, was frequently transferred from "on-the-spot" field locations to formal conferences in well-equipped classrooms. Using lecture demonstrations, films, written material, closed-circuit TV and other available media, our people were trained to handle the complexities of a modern communications system. In the process some of the close, personal touch was lost and accident frequency rates began to climb.

Questionable Assumptions

There is nothing wrong with the lecture-demonstration method or the use of sophisticated training materials. What sometimes goes wrong is that the student, particularly when in large groups, has little opportunity to demonstrate how much he has absorbed. It is often assumed that because something is taught, students must therefore have learned, and this is not always true.

Back to Basics

The Bell System Accident Prevention Plan returns to the time-honored technique used by the legendary foreman. Under the plan, a supervisor conducts employee on-the-spot training to reinforce safety knowledge wherever deficiencies are noted. He observes work operations to check know-how, training retention and the degree of employee compliance with safety rules and practices. Corrective action is taken when unsafe acts are observed but commendations are given for jobs done safely. The supervisor makes regular inspections of the work area to detect hazardous conditions and correct them.

Distributed with the Accident Prevention Plan are "Safety Knowledge Review and Rating Sheets" and "Work Observation Sheets" to help the supervisor systematically cover major safety points, to maintain a record of items discussed, and to note safe and unsafe work practices observed. The plan calls for the sheets to be filled out on each employee and suggests that the forms be discussed with the employee and retained in the employee's personnel file. The use of such forms is designed to insure a close one-to-one training relationship between the supervisor and each member of his work force.

Everyone covered

The plan is interdepartmental in scope and covers all employees. Initially, it requires supervisors to conduct quarterly reviews and report progress being made toward elevating general safety knowledge and the elimination of hazardous conditions. The reports are channeled through second-level supervisors, district and division to general level supervisors.

Company Safety Staff representatives are required to monitor the program systematically to assure that the company is following the provisions of Bell System safety practices as well as relevant provisions under OSHA.

Safety is everybody's business in the Bell System, from the chairman of the board to the most newly-hired apprentice. The Bell System Accident Prevention Plan is but another tool to help us get at this important job. Like all tools, if used properly and conscientiously, it can make the task easier. And when it comes to the task of reducing painful injuries and deaths, few would argue that we shouldn't give this new tool a chance. ☐

On the eve of his retirement, AT&T's General Counsel, Horace P. Moulton, looks back at some crucial moments that helped decide the direction of this enterprise.

Turning Points

To those only casually acquainted with Horace P. Moulton, the adjectives most frequently used to describe the man are "quiet," "courteous," "mild-mannered"– in short, the complete gentleman. Although "Moulton" is English in origin, it is a corruption of the French *mouton,* meaning lamb, so the adjectives are not only accurate, but exceptionally appropriate to someone so named.

Anyone who has heard Horace Moulton speak formally, however, would hardly characterize him as a lamb. His command of the language and the logic used to support his positions hardly conjure up visions of grazing sheep. Quite the contrary, some of the adversaries he has faced in court might even politely suggest kinship with a more aggressive, predatory species. That's one of the trifling things you learn to live with when you're an attorney–according to members of that profession.

Although his plans were not yet firm when he retired from the post of AT&T vice president and general counsel on January 1, Mr. Moulton said he expected to continue utilizing his legal training in some capacity in the future. This was hardly surprising. Few expected him to turn in his briefcase, pick up his golf clubs and idle away the golden years. He's just been too active a person.

Those in the Bell System most closely associated with him during the past 20 years point with respect to his concentration and dedication, as evidenced by the agile way he helped steer the corporate ship through the difficult shoals of litigation that often threatened to tear the bottom out. While some paint may have scraped off along the way, the ship came through intact. When talking about these difficult times, Mr. Moulton's memory warms most to the details of the major cases the company faced, and he downplays both his involvement and the personal side of his life.

Horace Moulton's interest in the law came at an early age–the fact that he was an only child and that his father was Chief Justice of the Vermont State Supreme Court undoubtedly had an influence. He obtained his LL.B. from Harvard Law School in 1931, was admitted to the Bar in Boston the following year, and for several years thereafter practiced law with a private firm in that city. He admits to handling the routine legal assignments usually doled to beginning lawyers, and remembers defending some criminal cases. He gave up private practice to become an attorney for New England Telephone and Telegraph Company in 1944 and was quickly caught up in the frenzied rate case activity of the postwar years.

It had been more than 20 years since the New England Company, and many other associated companies, for that matter, had last sought to increase rates. In the space of two short years, New England filed five separate rate requests with the appropriate regulatory agencies.

"It was a hectic time," Mr. Moulton recalls, "something akin to being caught up in the Great Flood. On one case alone, we tossed about for 40 days and 40 nights preparing and presenting our material. In

most instances the commissions looked on the applications favorably and set new rates with reasonable fairness. Massachusetts, however, allowed a woefully inadequate increase and would not reconsider. We finally had to take the case to court where we obtained the relief we needed."

His adept handling of the New England cases brought Mr. Moulton an offer to join AT&T's staff of attorneys, which he accepted. This was in the fall of 1951—a turbulent, troublesome time.

Two years earlier, in January 1949, U.S. Attorney Tom Clark had filed in Federal Court at Newark, N.J. a civil suit charging Western Electric and AT&T with violations of the Sherman Antitrust Act. In its 73-page complaint, the Justice Department charged Western Electric and AT&T with "unreasonably restraining and virtually monopolizing" the production, sale and installation of telephone equipment in the United States. The suit asked 20 items of relief, the major items being (1) that Western be divorced from AT&T and split into three competing manufacturing concerns; (2) that AT&T and its operating companies be compelled to buy equipment through competitive bidding, and that every interested manufacturer be entitled to submit bids; and (3) that the Bell System license its patents to all applicants on a nondiscriminatory and reasonable royalty basis.

AT&T vigorously denied the allegations and asked that the suit be dismissed. The company stated that it was convinced separating Western Electric from the Bell System would substantially increase the cost of its service to the public; make those services less reliable and efficient; cripple its ability to meet the ever increasing demands for more and better service; seriously hamper and retard the introduction of new developments into its communications system; and greatly curtail its ability to contribute to vitally important defense needs.

It was also AT&T's position that the law did not require these serious restrictions to be imposed upon the company or, much more importantly, upon the people of the country. The government took no further action in the case until August 1951, when it served AT&T with a legal order requesting detailed information on the operation of the business.

Says Mr. Moulton: "These demands for information were a clear indication that the Antitrust Division was now actively preparing for trial, and that the Bell System could no longer postpone its preparation."

It was an awkward time. The same year the Justice Department filed its suit seeking to break up the Bell System, the President of the United States asked the company to take over the direction of Sandia Laboratories. Both the Atomic Energy Commission and the Department of Defense urged the Bell System to take on this vital defense work because the integrated character of its research, manufacturing and operating facilities made it uniquely qualified to handle such important undertakings. Thus, one branch of the government looked on the Bell organization as a threat to be broken up, while another looked upon it as a strength which should be employed in the nation's behalf. At AT&T's request, the Department of Defense made several suggestions to the Department of Justice that the case be postponed, but no formal action was ever taken.

One branch of government saw the Bell System as a threat, while another commended it for national defense work.

Says Mr. Moulton: "In March 1953, the new Attorney General, Mr. Herbert Brownell, announced he had begun a personal review of major antitrust cases to determine whether they should be continued or dropped. We submitted a memorandum asking that the case against AT&T and Western Electric be dismissed. In the spring of 1954 the Attorney General advised us that while the case would not be dismissed, the Department was willing to enter discussion looking toward a possible disposition through a consent decree. From that point on, intensive negotiating sessions followed which culminated in the entry of the final judgment on January 24, 1956."

The final judgment did not require the divestiture of Western Electric—vindicating the position that our corporate structure was clearly in the interest of the public. However, the decree did contain some unprecedented provisions.

First, and with certain exceptions, the decree restricted the future business activities of the Bell System to furnishing regulated communications services, manufacturing equipment of the type useful in providing those services, and doing work for the United States Government. No other regulated business at the time had its activities so confined by law.

Western Electric was required to dispose of Westrex, a sound recording equipment subsidiary, Teletypesetter Corporation, another subsidiary, and to terminate the manufacturing of certain railroad dispatching and signalling equipment.

The most far-reaching and unprecedented provision required that licenses be granted to any applicant, on a nonexclusive basis, for all existing and *future* United States patents of the Bell System. Patents issued prior to the decree were required to be licensed *royalty-free*. Patents issued subsequent to the date of the decree were required to be licensed at reasonable royalties.

"No court," says Mr. Moulton, "had ever imposed a royalty-free patent licensing provision in any previous antitrust judgment. At the time, we estimated that this provision alone would cost the Bell System anywhere from three to five million dollars a year for the next 10 years. The patent on the transistor alone was worth a fortune, and that was only one of some 8,500 patents we gave up."

Originally employed by AT&T as one of several attorneys working on the antitrust case, Mr. Moulton rose rapidly through the ranks of the Legal Department while the case wore on. He was named general attorney in 1953, associate general counsel two years later, and, on T. Brooke Price's retirement in 1955, vice president and general counsel.

As the new general counsel, Mr. Moulton witnessed what he thought would be the final disposition of the seven-year-long antitrust action. But despite the severity of the judgment and the Bell System's acceptance of the provisions of the decree, there were those who thought political influence had been used to obtain a judgment unduly favorable to the Bell System.

Congress called for an investigation of all major consent decree cases of the time. The House of Representatives, in 1956, named a Committee on the Judiciary to study the Consent Decree Program of the Department of Justice. Heading the Committee was Representative Emmanuel Celler of New York.

"The Celler Committee wanted to assure itself that the negotiations leading up to our consent decree were open and above board. We had to bring out of retirement both T. Brooke Price, former general counsel, and Hal Dumas, former executive vice president, to testify. Mervin Kelly, who was then president of the Bell Labs, and myself, were also called upon to testify. For a period of three months, off and on, we took the stand and answered literally thousands of questions. It was both a time and energy consuming process and the newspapers gave a lot of publicity to it. In the end the committee filed its report and the matter dropped."

During his 17 years as AT&T's general counsel, Mr. Moulton proved himself something of a "genius" at his profession, providing you apply Samuel Butler's definition of that word: "One who has a supreme capacity for taking on trouble." Judging by the volume of major cases before the FCC and the courts during his tenure, AT&T's Legal Department could truly have been said to be running at super-full capacity.

"There was quite a flurry of activity following the consent decree as people who wanted to take advantage of the compulsory licensing provisions misinterpreted what our obligations to them were. Most of these cases were dropped. Other similar and unrelated cases came before the courts and the commission, which we successfully defended and won. Those that live longest in people's memories, however, are the cases we lost that now influence the conduct of our business."

Two of the most significant cases, perhaps, were the suits brought against the company by Carter Electronics Corporation and Microwave Communications, Incorporated. The decisions rendered in those cases not only resolved an initial complaint but set far-reaching precedents destined to have a continuing impact on the business for years to come.

In the Carter case, Carter Electronics manufactured a device called "Carterfone" which was designed to interconnect a private mobile radio communications system to the public telephone network by means of an acoustic, inductive coupling. In operation, someone in a remote location would contact a base station on a radio installed in his truck or car. The base station operator could in turn contact a third party on the telephone. By placing the telephone handset into the Carterfone cradle, the base station operator could then link the two parties.

"We opposed the Carterfone device," Mr. Moulton recalled, "on the grounds that it violated long-standing provisions prohibiting the interconnecting of foreign attachments to the telephone network. We pointed out that the telephone network is a nationwide mechanism made up of billions of intricate and delicately balanced parts which must operate together as an integrated assembly. If we allowed customer-owned equipment to be connected indiscriminately to that network it would compromise the reliability and dependability of the service we provided."

Carter originally filed his suit as an antitrust action in November, 1965. The Federal Court in 1966 ruled that the FCC had primary jurisdiction over the issues raised by the suit. The Supreme Court turned down a petition for review of that decision and FCC hearings began in April, 1967. On August 31, 1967 the FCC Hearing Examiner announced an initial decision favoring Carter, and the following year the full Commission upheld that initial decision.

> "Lord knows we fought long and hard for the right to operate as a completely integrated company . . ."

"What the Commission did was to rule invalid our tariff provision prohibiting the interconnection of customer-provided devices with the public toll telephone facilities. They said the tariff contained a blanket prohibition against harmless as well as harmful devices and was therefore unreasonable. In a subsequent tariff filing, however, the Commission acknowledged our duty and obligation to protect the system from harm and authorized the use of company-provided interconnecting devices as a buffer between customer-owned equipment and the network."

By setting aside the interconnection tariff which had been in effect for more than 40 years, the Carterfone case opened the way for others to provide customer communications equipment in direct competition with Bell System offerings. As of July 1972, there were more than 175,000 Bell System-provided interconnecting devices linking customer-provided equipment with the nationwide telephone network.

Another major legal battle was fought in the Microwave Communications, Inc. case. MCI initially sought permission to construct a microwave system between Chicago and St. Louis to offer a limited common carrier private line service. AT&T, Illinois Bell and Southwestern Bell opposed the MCI proposal on the basis that it would (1) result in wasteful use of the limited common carrier radio frequencies, (2) wastefully duplicate facilities already existing to meet the communications needs of users in the territory proposed to be served by MCI, and (3) begin to undermine the existing policy of uniform nationwide interstate rates.

In a very close decision (four to three) the FCC on August 14, 1969 granted the MCI application. The significant issue, of course, was whether and how such specialized common carriers as MCI should be allowed to compete with the established common carriers in providing transmission service between specific locations.

While some members of the commission felt the granting of such approval might ultimately destroy the Bell System's principle of nationwide average rate making, the majority viewed the approval as a means of providing stimulating competition. Commissioner Nicholas Johnson, for example, said granting the MCI request would "add a little salt and pepper of competition to the rather tasteless stew of regulatory protection."

"While we disagreed with the decision," says Mr. Moulton, "we did get from the Commission an understanding that the Bell System would be allowed to compete on an equal basis with MCI and other specialized common carriers. The Commission said that where such services are in direct competition, departure by existing carriers from uniform nationwide pricing patterns may be in order. While we have not yet resorted to this, the door remains open and we may very well be forced to change our pricing pattern in the future."

What if the launch proved faulty and TELSTAR fell on Miami Beach at the height of the tourist season?

The approval of the initial MCI application led to some 1,800 similar applications by more than 40 companies seeking to provide specialized communications in various parts of the country. Most of the applications have in common the construction of microwave facilities between two or more large cities where there is a heavy flow of communications and the opportunity to undercut Bell System pricing. The FCC is considering each application on its individual merits.

Says Mr. Moulton: "If enough of these high volume route applications are approved, it may well force the Bell System to move away from average pricing to some form of route pricing to meet competition and maintain a fair share of the market."

Following the Carter and MCI decisions, and a few other adverse rulings, some security analysts, shareowners and even a number of Bell System employees expressed the opinion that AT&T's heyday was over. As far as they were concerned, the cornerstones supporting the business had been pulled and if the business didn't topple completely, it certainly was going to be a far cry from the dynamic, growth-oriented company of the past. Mr. Moulton didn't share the view at that time, nor does he to this day.

"Some said we would go the way of the electric utilities. That is, we'd provide the nucleous interconnection network and by default allow others to design, manufacture and sell directly to the customer all his terminal equipment. While such competition is now allowed by the FCC, we certainly aren't going to abandon that end of the business. Lord knows we fought long and hard for the right to operate as a completely integrated company; we certainly don't intend to give it up voluntarily. Not only that, but I strongly suspect that even should we want to take that step, the FCC wouldn't allow it. Can you imagine customer reaction if we told them that beginning next month we are removing your telephone, and if you want your service to continue you'll have to go out and buy a set of your own? No, sir. I am convinced we will continue to provide our customers with the type of service that best meets their needs, and we will grow as we have in the past."

Not all the work of the AT&T Legal Department is of the momentous, cliff-hanging, precedent-setting type destined to drastically change the future course of the business. A good portion is routine. Some of the work, such as interpreting tax laws, dealing with patent infringements, FCC filings and the legal aspects of financial and personnel matters is grouped at the corporate headquarters office for practical efficiency. All of the work is important, and Mr. Moulton is quick to credit and praise the high-calibre performance of the eight AT&T General Attorneys and their staffs.

"Much of the staff work never gets publicized and some of it is extremely important and critical. If we go into a situation well-prepared, sometimes matters are dropped and there isn't even a ripple in the pond to indicate the weeks and months of research that we devoted to support our position."

As a case in point, on July 10, 1962 TELSTAR was launched into an elliptical polar orbit, and the world cheered. Prior to the launch, in the very early planning stages of the project, serious consideration had to be given to the legal liabilities which might ensue if the launch proved faulty and the rocket and its payload fell on a place like Miami Beach—at the height of the tourist season. At the suggestion of the Legal Department, the company purchased special insurance from Lloyd's of London with a face amount of $50 million. Fortunately, the policy rights never had to be exercised.

"There were other knotty problems to consider with TELSTAR, as well," Mr. Moulton revealed, "including the fact that, once in orbit, the satellite would pass over nearly every foreign nation. While there were some precedents that outer space should be free for exploration subject to international laws, no one had clearly defined where airspace ended and outer space began. Happily, everyone recognized the peaceful purpose of TELSTAR and no foreign government ever protested its launch. Still, we had to be prepared to defend ourselves if anyone raised questions about our legal right to perform the experiment."

Looking back over the years he's devoted to practicing law for the Bell System, Horace Moulton claims that if it were in his power to choose a different career he couldn't think of anything he would rather do.

"All careers are somewhat fortuitous," he reflected. "There continues to be more than just a kernel of truth to the notion that most careers are shaped by being in the right place at the right time, though it helps to have the knowledge to get the job done."

There are many people in the Bell System today who agree it was also fortuitous that Horace Moulton was there when needed.

William P. Kuhs, Associate Editor

VANDALISM REVISITED

Our July/August issue of 1972 featured an article on vandalism by Professor Philip Zimbardo. After it appeared, we received comments from Curran Tiffany of AT&T's Federal Relations organization in Washington. As the matter is important enough to warrant another view, we offer Mr. Tiffany's:

Professor Zimbardo leans to an ideological view that alienation, leading to vandalism, "is a human reaction to perceived social injustice," or "rebellion with a cause." Among his solutions:

- Combat social apathy, isolation, and the loss of community, neighborhood and family values.
- Apply a principle (the Professor says "reaffirm" it) that "human rights are more important than property rights."

This is indeed tantalizing because, apart from the vague put-down of property rights, he doesn't suggest any values, or how to find them. This is a fundamental and difficult problem. As Alexander Solzhenitsyn has written: "In the various parts of the world, men apply their own hard-earned values to events, and they judge stubbornly, confidently, only according to their own scales of values and never according to any others." And yet there persists a widespread belief that certain values transcend all differences.

Professor Zimbardo has not told us the values he would fight for, except that "human" rights outrank "property" rights, and he speaks favorably of "social justice." But the segregation of property rights from other rights of people is an illusion. The English and American common and statutory laws have, over the centuries, evolved finely balanced approaches dealing in combination with offenses to person and property. Both kinds of offenses deny human rights. Some property rights are, and have always been, among the dearest of human rights, and attacks on such rights always characterize the programs of despots as well as vandals. As for social justice, what is it? Opportunity for all? Imposed redistribution of wealth?

Let me suggest that the vandalism phenomena Professor Zimbardo himself observed can throw light on the problem. In his experiment, cars were exposed to vandalism risk in the California suburb of Palo Alto, but were unharmed. He concluded that "for the time being at least," the community and community values are okay in the suburbs. On the other hand, cars he exposed in the Bronx, New York City, came to grief. He linked this to "social conditions that increase boredom, that prevent constructive outlets for anger and protest." Boredom, plus the researched fact that "smashing . . . is pleasurable," he believes lead to vandalism.

This sounds plausible, but it doesn't fit the experimental observation that the vandalism "was executed by well-dressed, clean-cut, white adults" who looked like "mature responsible citizens." Morever, much of the observed behavior was plain theft of salable parts. It would seem these were not persons suffering from the forms of "social injustice" mentioned by the Professor. Perhaps there are inner causes for "rebellion" that can operate somewhat independently of "social injustice" or other degree of societal provocation? Micah, 700 years before Christ, said of the privileged of the cities, "For the rich men thereof are full of violence."

Then and since, in many societies, men who had no lack of "constructive outlets" and who have received no injustice—often men whose will determined what would be called justice—worked violence upon the property and persons of others. Just as with the depredations on the Professor's automobile, sometimes it was done for profit; sometimes just for the hell of it.

Another approach to the solution the article offered was the fight against "apathy" and the loss of "community, neighborhood and family values." All good men will agree to this, but what values? Those of Palo Alto? And how to fight? Whatever way they do it in Palo Alto? As a social scientist, Professor Zimbardo will be on target if he studies Palo Alto, and other communities and cultures where vandalism is not a problem, and tells us what values are held, and how and by whom they are inculcated and maintained. For without shared values in community, neighborhood and family, all social relationships (including business) are built upon shifting sand.

Here Solzhenitsyn is in agreement. Now that broadcasting and printing are "surpassing all barriers" that used to keep separate value systems from close contact, "mankind cannot exist in the face of six, four or even two scales of values: We shall be torn apart by this disparity . . ." However, he sees a means of reconciling value scales to one system of interpretation of good and evil—the means of art and literature—which can condense and communicate widely and effectively the experience of others. They can, he says, even overcome violence, which does not live unless "interwoven with falsehood." For the courageous artist and writer, "one word of truth shall outweigh the whole world."

Many of us are not gifted to capture the experience around us in artistic form for the benefit of the world. But we urge that the social scientist, as well as the artist, take a closer look wherever shared values are bearing fruit, not only in the absence of vandalism, but in the goodness and truth which Solzhenitsyn seeks. Bernard Berenson has complained that artists have failed to do this, and have abandoned concern with the good to concentrate almost wholly on the wicked, corrupt and ugly. The same fascination with the ugly seems to preoccupy the social scientists. We can and should ask our experts to teach us where and how good things are happening.

ST. LOUIS
MO.

BLK. RT.
U. S. POSTAGE
PAID
ST. LOUIS, MO.
PERMIT 462

KANSAS CITY PUB LIBRARY 001
PERIADICAL DEPARTMENT
KANSAS CITY MO 64106

AT&T

American Telephone and Telegraph Company
195 Broadway, New York, N.Y. 10007

Moving? Please inform the *BTM* circulation coordinator
in your Bell Company's Public Relations Department.
Please include the mailing label from this issue.

Printed in U.S.A.

Printed on recycled paper.

Bell
TELEPHONE MAGAZINE

MARCH-APRIL 1973

[illegible]
PUBLIC LIBRARY
APR 19 1973

Bell
TELEPHONE MAGAZINE

VOLUME 52 NUMBER 2 MARCH/APRIL 1973

2 **What Are Our Priorities?**
By John L. Curry
What does the public expect from business? AT&T's public relations director, research, discusses a Yankelovich survey.

6 **Communication by Molecule**
By Isaac Asimov
The famous science-fiction writer and professor of biochemistry takes a long look into the future at a supercomputer.

12 **Everything You Ever Wanted to Know . . .**
About corporate state and local taxes—one of the System's costliest outlays.

16 **On the Move Again**
Bell System managers feel the vibrations of change, and they tell why in a series of interviews on the state of the business.

24 **A Gathering of the Owners**
The people who own AT&T stock come in all sizes, shapes and colors; they live all over the world. Here's a profile.

26 **Open Door, White Knight, Wrong Preposition**
By Al Wood
A former division plant manager has some acute observations about the myths that he sees blocking good employee communications.

30 **Sent to Help Managua**
An earthquake left Managua without communications. Seven men from Southern Bell and Long Lines helped restore vital service.

John D. deButts
Chairman of the Board
Robert D. Lilley
President
William L. Lindholm
Vice Chairman
Frank A. Hutson, Jr.
Secretary
John J. Scanlon
Treasurer

Leonard Moran
Editor
Al Catalano
Art Director
Donald R. Woodford
Managing Editor
Edward J. Swartz
Associate Editor
William P. Kuhs
Associate Editor

Published by
American Telephone
and Telegraph Company
195 Broadway,
New York, N.Y. 10007
212 393-8255

What Are Our Priorities?

by John L. Curry

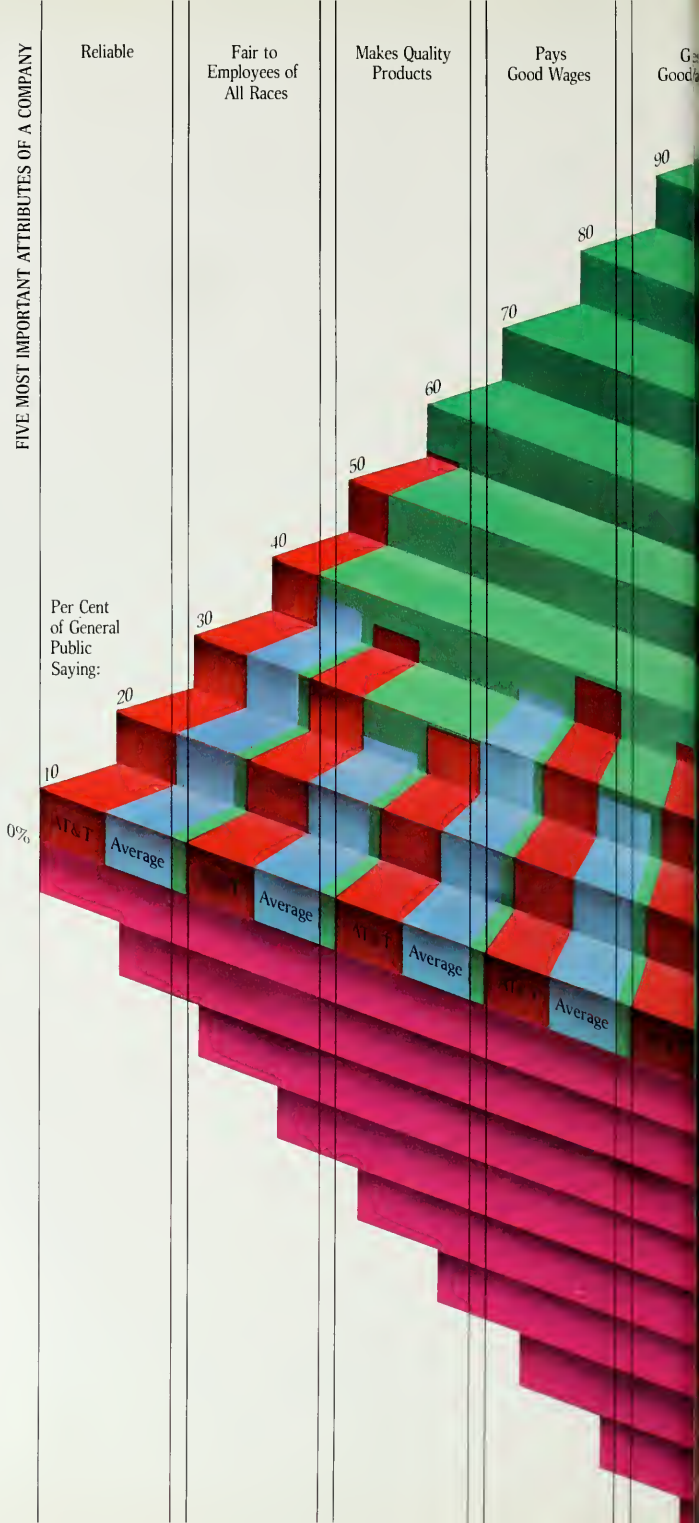
In recent years this magazine has included many articles on the dimensions of new social problems, new solutions for older problems and tentative solutions for new ones. In the middle of all this, we find ourselves scratching our heads and wondering if there is any way to see the whole thing in perspective, so that we can sort out the right approaches. It has only been in the last few years that applied social research, particularly opinion research, has begun to concentrate on the social and political trends that business must understand and cope with. The new venture in opinion research described herein is that kind of effort.

In 1972 AT&T joined ten other major American firms as sponsors of the first Corporate Priorities Study. The work was done by Daniel Yankelovich, Inc., a well known commercial and social research firm based in New York.

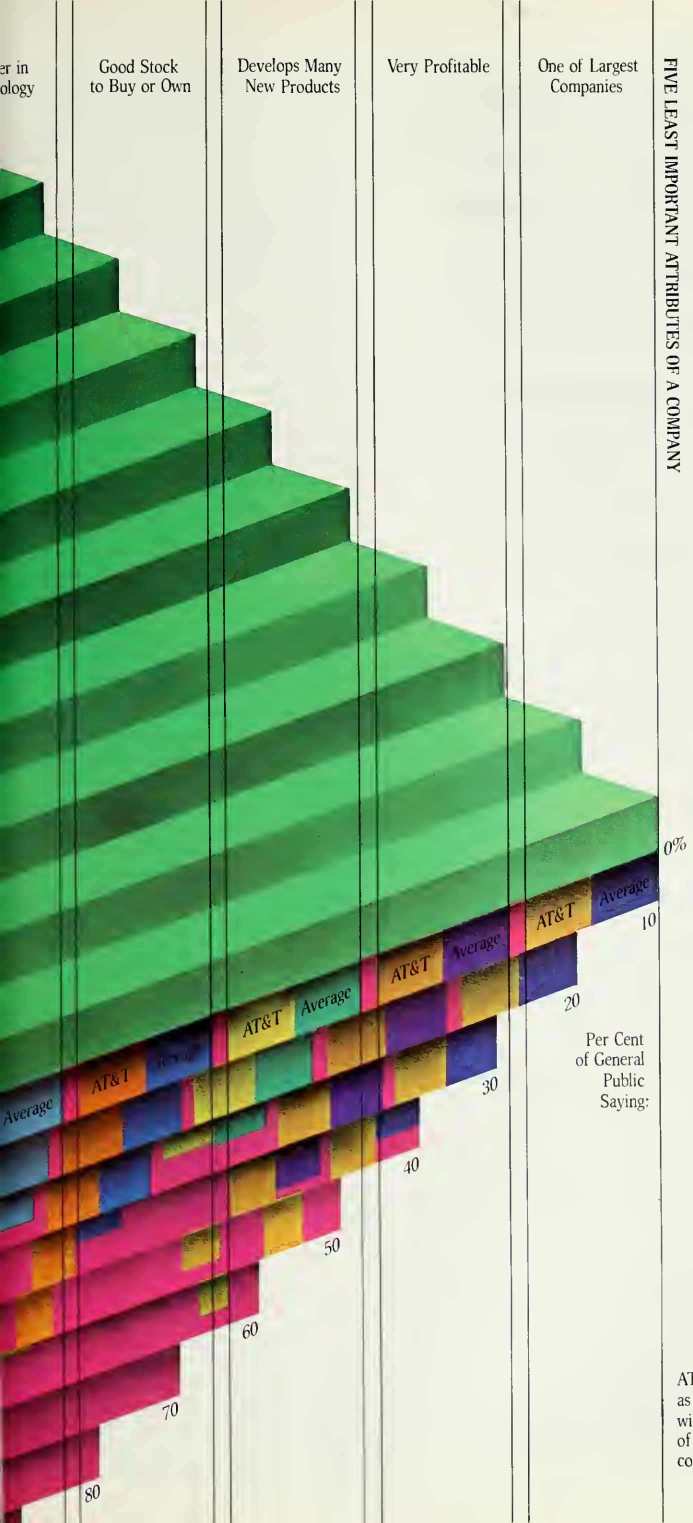
Since the findings of the initial Corporate Priorities Study have been reported to the Bell System's top management, they have evoked considerable interest from others. This article will attempt to acquaint Bell System managers generally with the way the Bell System interprets some of the Study's major conclusions, so that they can reach their own judgments as to how such conclusions fit into their work and responsibilities.

The concept of the Study is to match the views of the general public with those of different leadership groups in this country so that it will be easier to determine just which social issues a businessman should consider as an essential part of doing business in today's world. To this end, 2500 intensive personal interviews were conducted among cross sections of the general public, and of leadership groups in federal and state government, national and activist organizations and the investment community.

Before the work was begun, the



FIVE LEAST IMPORTANT ATTRIBUTES OF A COMPANY



AT&T
as compared
with average
of six major
companies.

Yankelovich organization, working in conjunction with the sponsoring organizations, developed a list of more than 150 proposals for change that would involve corporate operations. Virtually all of them involved current social issues that, in turn, had some impact on business. These issues were then reduced to 30 major social "demands" that were evaluated by all respondents in the study. One way of doing this was to ask each person interviewed to put each of them in order of importance to him. Another was the use of trade-offs, which asked what he would be willing to give up to achieve an important objective. As an example, would he be willing to use non-leaded gas in his car, *with the penalty of paying a higher price*, in order to reduce air pollution.

These 30 demands were finally summarized, based upon what respondents told the Yankelovich people, in four major areas of social concern. These were: Environment, Consumer Protection, Worker Demands and Corporate Social Responsibility. The demands in each of the four areas are listed in the accompanying tables.

So much for how the work was done. The important thing is what was learned about each area, and how it might relate to the Bell System. Looking at demands involving the *Environment* first, the Study makes clear the urgent concerns of all with respect to air and water pollution. But it also makes clear the concern about cleaning up these pollution problems at the expense of limiting technology. With the strong dependence on technology that the Bell System has, this is an important finding for us. The general public conclusion here is that technology will also be required to solve these environmental pollution problems, and that this effort should not be hampered.

In the future, the Bell System may also become more involved with the environmental demand for beautifying the landscape once the more urgent problems are brought under better control. This demand involves such telephone items as overhead cable and discarded directories. In other words, once the more pressing problems are dealt with, our turn could come.

Of greater importance to the Bell System are the demands listed under the *Consumer Protection* area in the Yankelovich study. Our involvement is high with five of the seven so listed, the exceptions being the demands for making products safer and for truth about products. Visible manifestations of the other five demands are already with us today, as many Bell System companies will attest. Our Public Overview study, which has been conducted in the last two years to develop national customer attitude trends, shows a continuing decline in the number of customers who say they get their money's worth from telephone service and that their telephone service is a good value when compared to other things they buy. Thus, our own sources corroborate the importance of the consumerism movement.

Interestingly enough, the Corporate Priorities Study shows that those most concerned with consumer protection are the younger, better educated and more affluent. Our Public Overview shows that these same people, as telephone customers, are more inclined to be critical of their service and to give us low marks on getting their money's worth and value.

Other aspects of the whole Consumer Protection issue are also of interest to the Bell System. Those interviewed in the Corporate Priorities Study, both the general public and the leadership groups, agreed that the responsibility for insuring better consumer protection rests with business. Institutional investors, those controlling large investments made by banks, insurance companies, mutual funds and pension funds, tended to feel that companies that do *not* meet consumer demands better in the future would be poor investment risks. Considering the importance of the investor group to our financial needs, this finding offers still another reason why this is probably the most important area of all in the Corporate Priorities work for the Bell System.

The third area covered by Yankelovich in the Corporate Priorities Study, *Worker Demands*, also has great importance for us. Many of these are already surfacing in the daily headlines and in recent labor negotiations. For most of these demands pressures come directly from the work force itself, with the leadership groups, particularly at federal and state government levels, giving them only moderate support. The majority of these worker demands also have a direct relationship with what is going on in the Bell System today.

For example, the demand for more on-the-job training has the most urgency for blue collar workers and for younger workers most dissatisfied with their present chances for advancement. We also found, in the most recent Public Overview study, that our customers seem not to be too impressed with the training telephone people have had, as evidenced in the service these same customers get. Thus, again from both internal and external sources, we infer that better training may be more important than we previously thought.

Closely allied to the better training demand is the issue of meaningful work. Both workers and government leadership people see satisfying this demand as the responsibility of management people. They do not mean just top management, but management at all levels. Our job enrichment programs try to meet this need; the importance of the demand argues that they should be broadened and intensified in the future.

Two other demands in the Worker Demand area have already received strong support from the federal government leadership, and what seems to be growing support from union membership. These are for special attention to minorities and equal opportunity for women. Our growing concern with both demands during the past few years is ample evidence of their importance to Bell System management.

The final area covered in the Corporate Priorities Study, *Corporate Social Responsibility*, includes six demands of a varied nature. All of them apply to the new relationships of the American corporation with government and with society. Two of them, demands for new human rights and for changing govern-

ENVIRONMENT

Beautify landscape

Clean up air pollution

Clean up garbage, litter

Clean up water pollution

Limit technology

Protect natural resources

Reduce overcrowding

Reduce noise pollution

CONSUMER PROTECTION

Improve product quality

Make products safer, healthier

Protect privacy

Respond to complaints

Restrict advertising

Truth about prices, value received

Truth about products, companies

ment priorities, reflect direct pressures on government rather than on business. All the rest have a more direct relationship with what a corporation does in today's world.

We in Bell System management are again involved with the implications of those demands that relate directly to the actions of business. Two of them, the use of business resources to solve social problems and an increase in corporate giving, are cases in point. On the former, there is a definite feeling that business today does have a role to play in solving social problems that goes past its normal business-oriented responsibilities. However, there is encouraging recognition of the limitations on the capabilities of business to solve these problems. This adds some rationality to a debate that has been going on for several years, and seems to assure businessmen a better way to continue "doing their own thing."

The demand for more corporate giving does not seem as important as some of the others. The public preferences for giving, we have found, tend to favor new and more active recipients, such as medical research, the fight against drugs and juvenile delinquency and so on. There seems to be little awareness of the extent to which such recipients of corporate giving as hospitals, the Red Cross and local community funds, are also active in these preferred causes. On balance, the findings of this demand are not so much that we change the pattern of our giving as that we make sure the activities of the present recipients are better understood.

The remaining two demands in the Corporate Social Responsibility area involve limiting the size of corporations and increasing government regulation of them. To some degree both reflect the growing public disenchantment with business. There is substantial evidence that neither demand will receive widespread public or leadership support unless specific actions of businesses, apparently counter to the public interest, provoke it.

The Corporate Priorities Study also gives us additional information about our own business. This consists of a rundown on the important characteristics of a company today in the eyes of the general public, contrasted with our own "image". In years past, we have conducted separate "image" studies to obtain this kind of information, which has often been valuable in changing our practices and policies to bring them more in line with what our customers need and expect from us.

WORKER DEMANDS

Equal opportunity for women

Extend non-financial fringe benefits

Financial rewards above salary

Increase democracy in the Company

Meaningful work

More flexible work arrangements

More on the job training, education

Protect jobs

Special attention to minorities

CORPORATE SOCIAL RESPONSIBILITY

Change government priorities

Curb size of corporations

Increase corporate giving

Increase government regulation of business

New human rights

Use business resources for social problems

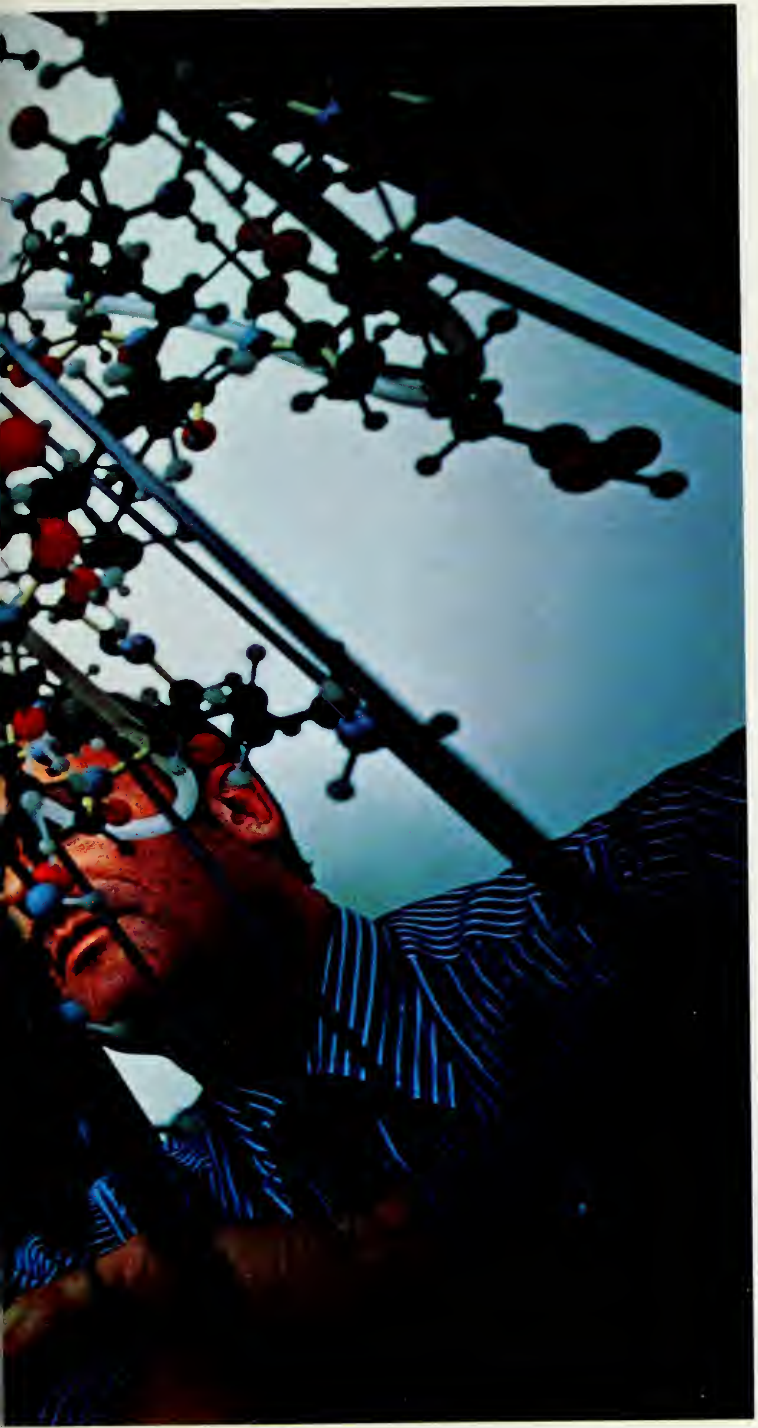
This time out, we have "image" information in a larger context, so we may see how others do and how we do, all compared with the public's present expectations. The table shows the five *most* important attributes of a company today. It also shows the extent to which AT&T, or the Bell System, is judged to have these attributes, and, too, the average of six important American corporations including ours.

Our own performance on the most important items, which shows the influence of the trend of public thinking toward consumer protection, is substantially better than the average for other companies. We still have some room to move, indicated by the spread between public evaluation of the attribute's importance and the degree to which we are judged to have the attribute.

The table also shows the five attributes of a corporation that were judged *least* important by the general public. In this evaluation, we are substantially in the lead over other companies on four out of the five items. Nonetheless, the public is now moving away from these characteristics as the criteria for judging a company. A change in the Bell System image, which depends a lot on what we do differently in the future, seems to be in order.

Looking to the future, the Corporate Priorities Study should have increasing value for us, as more data are obtained and longer trends are established. Added to this will be similar data and trends from our own Public Overview Study. Taken all in all, the end purpose of all this work is to point out for Bell System management people how the world is changing and what we must and should do to change with it.

Mr. Curry is Public Relations Director-Research in the Public Relations and Employee Information Department.



Isaac Asimov, easily among the world's leading writers of science fiction and a distinguished professor of biochemistry, takes a look at some of the intriguing possibilities in

Communication By Molecule

The general trend in electronics is toward miniaturization. Once, it required a large vacuum tube to control electron flow, but such a tube gave way to the much smaller transistor. Since the transistor was first announced to the world in 1948, it has grown steadily smaller and more reliable, and circuit elements have been introduced by the thousand into tiny chips that are barely visible.

Are we approaching a limit? Not yet. There is a computer-like device of proven practicality that handles information by means of units far smaller than anything man's technology has been able to handle. Imagine a hundred billion individual components, each so small that the whole device weighs no more than three pounds and is no more than nine inches along its longest diameter.

We call the device the human brain.

The individual components of the human brain are the various

The DNA molecule is enormously complex and to study its intimate electronic control is a vast undertaking

cells that make it up; but the cell, tiny though it is, is far more than a simple on-off switch. Each cell is, rather, an intricate and well-organized complex of molecules and it is these molecules that, in a way, are the units involved.

The key molecules present in all cells are those of proteins and nucleic acids. These molecules are large ones, made up of anywhere from hundreds to hundreds of thousands of atoms; and it is these molecules that are capable of storing and transmitting information in a sufficiently controlled manner to support all the manifestations of life. These molecules (large though they are as molecules) are too small to be seen by even the best optical microscope, and that is surely small enough to satisfy any miniaturist of today.

How do such molecules work?

To begin with, all the characteristics of any species of organism, and of any individual within that species, are controlled by the total interrelationship of the chemical reactions going on within its cells. The individual chemical reactions within the complex are controlled by certain protein molecules called "enzymes." Each enzyme can cause particular chemical reactions to proceed very quickly – reactions which, in the absence of those enzymes, would proceed much more slowly.

By controlling the nature of the enzyme mix, then, the nature of the overall chemical reaction pattern would be fixed. Within a particular fertilized egg-cell, for instance, there would be a particular enzyme mix that would bring about a set of chemical reactions that would, in its turn, bring about processes that would lead from the egg cell to a codfish, or lobster, or ostrich, or giraffe, or man, or any other of the more than a million living species of organisms. And this without a mistake; no codfish ever laid an egg which developed into a giraffe.

But what decides the nature of an enzyme? Each enzyme molecule is built up of a chain of 20 different varieties of "amino acids." These can be put together in a vast number of different orders. A hundred amino acids, including five of each variety, can be put together in 40,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000 different ways. The substitution of an amino acid of one kind for that of another can change the nature of an entire long chain, even when that is the only substitution. The mere reversal of two amino acids, introducing a slight change in the order, can change the nature of the chain and alter its chemical properties.

Something in the cell, then, must be capable of overseeing the formation of enzyme molecules of fixed amino acid orders. If fertilized egg cell after fertilized egg cell is going to develop into a man and not a giraffe (or vice versa) and do so with sufficient precision to make one man very much like another and one giraffe very much like another, the control of the formation of enzymes must be tight and very exact.

The information device that oversees enzyme formation is contained in the "chromosomes." These chromosomes, arranged in pairs within the central nuclei of cells, are carefully duplicated in the process of cell division so that every new cell has a set of chromosomes for itself. The fertilized egg cell has one chromosome of each pair from the mother and one from the father.

Each chromosome is made up of a long line of molecules of a type known as "deoxyribonucleic acid," usually abberviated as "DNA." The DNA molecules are made up, in turn, of long chains of smaller units called "nucleotides." These come in four different varieties, with chemical names usually abbreviated as A, C, G, and T. The nucleotides can be arranged in any order and in any proportions. To have one nucleotide replaced by another, or to alter the order even slightly is to change the characteristics of the DNA molecule. There is as enormous a range of possible orders of nucleotides as of amino acids. Nevertheless, each species has its own characteristic supply of DNA molecules of a given type; and each individual within the species has a set in which the order is not quite like those of other individuals. It is this which makes you and me both human beings and yet each distinct.

How are nucleotide arrangements kept fixed? It turns out that each DNA molecule is composed of two twined strands that fit each other as a key fits a lock. At the time of cell division, the strands untwine and each brings about the formation of a new companion that fits itself. The lock, so to speak, brings about the formation of a new key; the key, a new lock. Each daughter cell can then have its own set.

Occasionally, the new formations aren't perfect and slight changes in nucleotide composition or arrangement take place. As a result of such "mutations," new cells form that don't have quite the characteristics of their progenitors, or young organisms that don't have quite the characteristics present in one or the other of their parents. The changes produced by random mutations help bring about evolutionary development.

Given DNA molecules characteristic of an organism, how is enzyme structure controlled? If one goes along the DNA molecules and groups the nucleotides three at a time, one finds 64 different possible combinations (ATA, GCT, TCA and so on). Each of the 64 triples is equivalent to one or another of the twenty different amino acids. The information from the DNA molecules (that is, the order of the triples) is transferred to the site of enzyme manufacture by intermediary molecules called "messenger-RNA" and "transfer-RNA." The enzymes that are then formed reflect, in their structure, the makeup of one section or another of the DNA molecules in the chromosomes.

If technology is ever to duplicate the technique of storing and transmitting information by use of molecules, the fine details of the process must be understood. All chemical reactions involve changes in electrons and it would be necessary, therefore, to understand the fine electron-changes in the workings of DNA.

At Bell Telephone Laboratories, one attack is to expose DNA and individual nucleotides to ultraviolet radiation. Electrons will absorb the energy of the ultraviolet light and enter what are called "excited states" in which they contain more energy than they normally do. They will not retain that energy long but will give it up as light of wavelengths different from that of the ultraviolet they had originally absorbed. This re-emission of light is called "fluorescence." From the detailed nature of the fluorescence something can be deduced concerning the behavior of the electrons. Distinct differences in fluorescence characteristics are noted when nucleotides are lined up in different arrangements, for instance.

Continuing studies of this sort can yield their most direct dividends in illustrating how ultraviolet light and other energetic radiation alter the chemical nature of DNA molecules, producing mutations, cancer, even death. To understand the mechanism is to increase the chance of developing techniques for protection against such changes. In addition, and more fundamentally, such studies might bring enlightenment as to the details of how molecules such as DNA function on the electronic level.

Of course, the DNA molecule is enormously complex and to study its intimate electronic control is a vast undertaking. If simpler molecules also display such control, it might be useful to investigate them. The knowledge gained in that way can serve, perhaps, as a steppingstone toward an understanding of the more complex case.

Consider hemoglobin, for instance. It is a protein molecule of average size, less than a tenth the size of a DNA molecule. Hemoglobin is found in the red blood corpuscle and its functions are considerably less complex than those of DNA. Its most important action is to pick up oxygen molecules at the lung and to then give up those molecules to the various cells. About 96 percent of the hemoglobin molecule is made up of four chains of amino acids. The rest of it consists of four comparatively small structures called "heme." Each heme is a roughly square arrangement of atoms (mostly carbon and hydrogen atoms, with several oxygen and nitrogen atoms) at the center of which is a single iron atom. It is the iron atom, specifically,

If technology is ever to duplicate the technique of storing and transmitting information by use of molecules, the fine details of the process must be understood

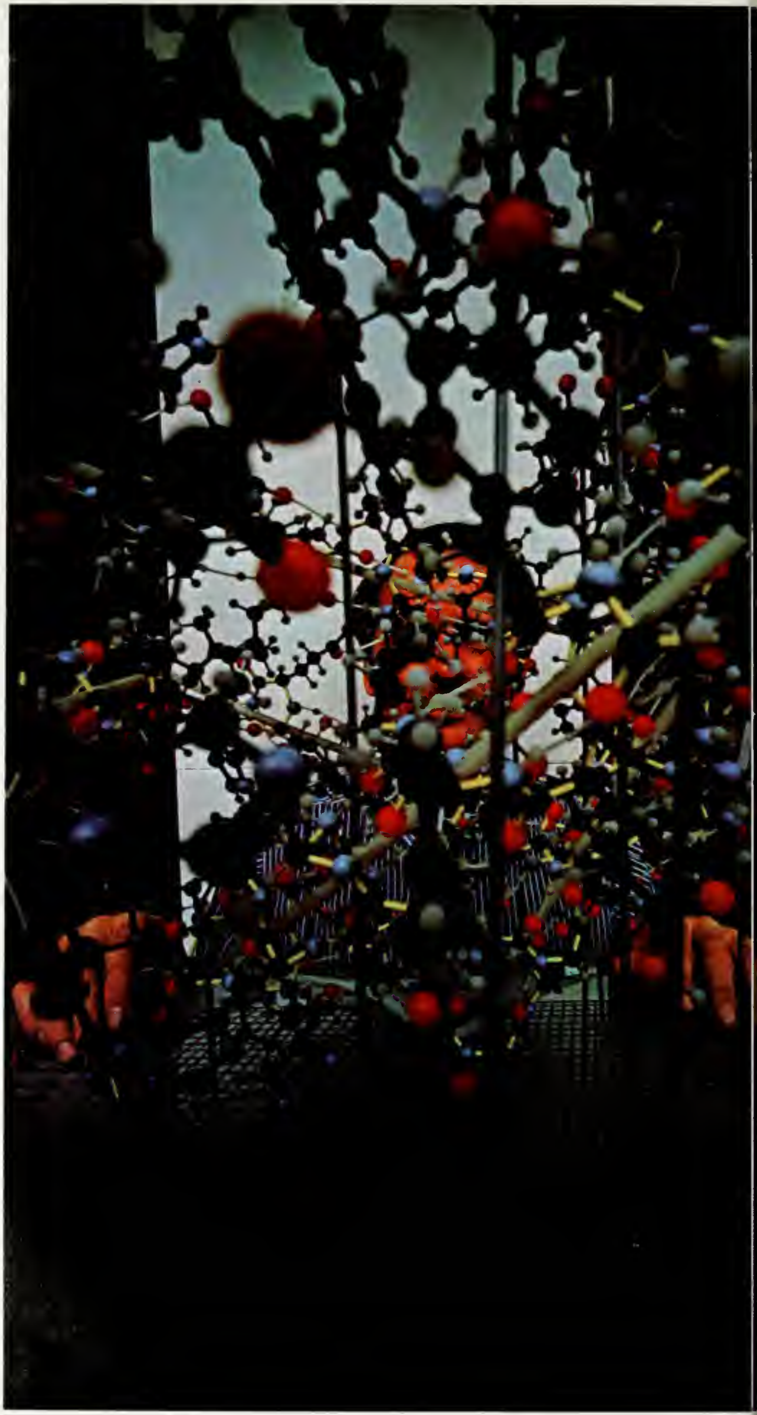
that picks up the oxygen molecules.

Since each hemoglobin molecule contains four heme structures and therefore four iron atoms, each hemoglobin molecule can pick up four oxygen molecules. Ordinarily one would expect that when a hemoglobin molecule picks up one oxygen, it would become more difficult for it to pick up a second; then still more difficult to pick up a third; and most difficult to pick up a fourth. That is what we would expect, judging from most chemical reactions. Yet this is not the case with hemoglobin. When a hemoglobin molecule picks up an oxygen molecule, it can then pick up another oxygen molecule with *greater* readiness. It is as though hemoglobin grows hungrier the more it feeds, so that it is much more efficient as an oxygen collector than it would otherwise be.

But why does this happen? Apparently, the act of picking up an oxygen molecule changes the chemical nature of the hemoglobin in a subtle manner, so that the remaining heme groups can more easily combine with oxygen. The four heme structures on the hemoglobin molecules where the oxygen actually binds are immersed in a large volume of amino acids making up the protein. By studies of the heme group it has been possible to show that the changes responsible for the increased desire for oxygen do not occur at the hemes, where the oxygens are attached, but rather are smoothly distributed throughout the protein.

At Bell Telephone Laboratories, the nature of these changes is being studied by a technique called "nuclear magnetic resonance," usually abbreviated "NMR." In this technique, an atomic nucleus, particularly one of hydrogen, is kept in a strong magnetic field and exposed to radio waves. Such nuclei will absorb radio waves; and the particular wavelength that is most readily absorbed depends on the exact distribution of electrons around that nucleus.

By studying the NMR of hemoglobin before and after one or more oxygen molecules have been picked up, something about the electron shifts that take place is being determined. The delicacy of the con-



trol is indicated by the fact that there are abnormal hemoglobins which do not behave as efficiently as normal hemoglobin does when it comes to picking up oxygen. Yet such abnormal hemoglobins may differ from the normal variety by a single amino acid out of 141 in each of two of the amino acid chains in the molecule.

If by means of such research studies as are now proceeding at Bell Telephone Laboratories, we should master the principles of molecular communication, we will become ready to take an enormous additional step downward in the scale of miniaturization.

Computers with molecular memories may be no larger than those now in operation, and yet have memory banks large enough to contain the accumulated knowledge of the human race. We could then easily envisage a central computer serving the nation, or even the world, and acting as the general reference library for the population. Government bureaus, industrial firms, educational or research institutions, even individuals, might have access to such a computer and might be able to ask at any time for those nuggets of knowledge not to be found in easily accessible ordinary references. The vastly increased ease and thoroughness of information flow along the arteries and veins of human society might give a further impetus to intellectual and scientific advance—in the same way that printing once served the same purpose.

A computer of moderate size might serve to encode all human beings on Earth. They might be listed by all the various categories: age, sex, height, weight, nationality, marital status, education, profession, hobbies, medical data, legal data, everything—and with everything kept continually up to date.

To those of us brought up with the ideals and habits of a simpler society, a total computerization of mankind may seem repugnant and yet it may be that only thus can a multi-billion-person technological world be run efficiently.

And if computers can be built so compactly, and if information can be handled so quickly and in such quantity, there will be room to imagine computers more complex, by far, than anything that exists now, yet without expecting them to be of exorbitant size. A computer might be designed that would not only store data and produce it at will, but that would, on request, sift and correlate such data and come to conclusions on the order of complexity expected of the human brain. It could, in short, be made to reason.

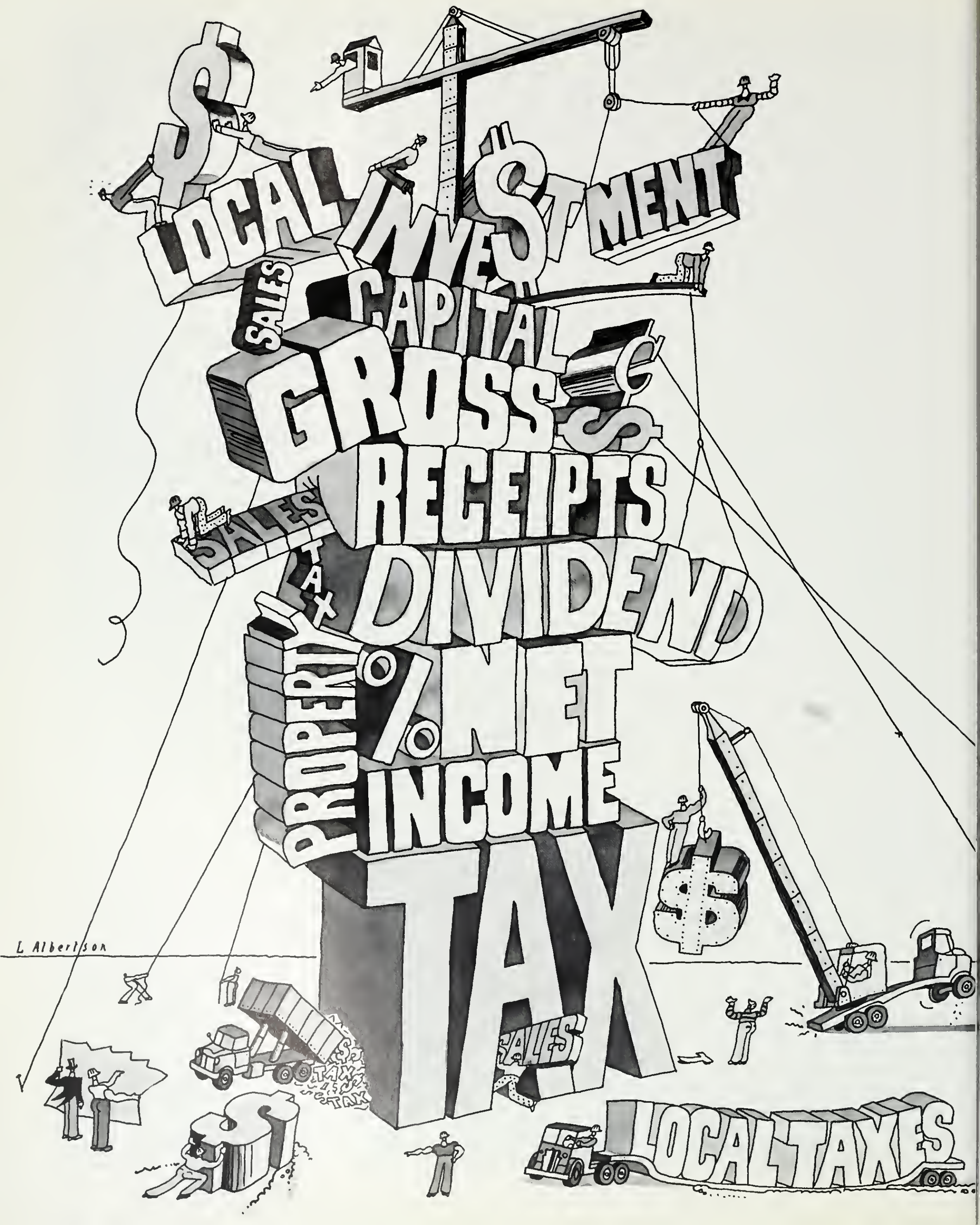
If a true scheme of molecular information can be put into use by mankind, what is to prevent a computer from being made as complex and versatile as the human brain and perhaps no larger? Perhaps, by thoughtful designing, by the proper choice of molecules (including those not available in the brains of living organisms) and by the use of solid-state adjuncts, a brain-like computer could be built that would be stabler than the human brain; one that could resist higher temperatures, higher radiation levels; one that would be immune to fatigue or to hallucination, and so on. With such compact computer-brains, we can easily visualize that science-fictional dream, the intelligent robot.

At such a point, the question could be introduced as to whether we should stop at a level of complexity and versatility equal to that of the human brain. Having reached that level, should we go beyond it, too, and imagine computers (or robots) of more-than-human intelligence?

Would we then be replaced? Would Homo sapiens give way to Robot sapiens, as once the reptiles gave way to mammals? The argument might be offered that evolution progressed by slow, random change until there was developed a structure complex enough to add purpose to evolution. The human brain being the instrument that adds such purpose, the new and superior computer intelligence could then be seen as the next step in a new kind of evolution.

Of course, other things could be said, too, and other arguments offered. In any event, it would all be testimony to the profound importance of a subject whose dimensions are only now beginning to emerge. □

A computer might be designed that would come to conclusions on the order of complexity expected of the human brain


LOCAL
INVE$TMENT
SALES
CAPITAL
¢
GROSS
$
RECEIPTS
SALES
TAX
DIVIDEND
PROPERTY
%
NET
INCOME
TAX
$
SALES
$ TAX $ TAX
LOCAL TAXES
L Albertson

Everything
you ever wanted to know about
CORPORATE
STATE & LOCAL
TAXES
...but never cared enough to ask.

Once upon a time—that is, about 20 years ago—movie theaters used to run a comic relief short-subject that opened with a title shot of a larger-than-life 8 ball. From behind the ball appeared a harassed looking character named Joe Doaks. Joe, who was never satisfied with his lot, began each day, it seemed, with a new career. Hence, his comedic adventures had titles like: "So You Want to Sell Encyclopedias," or "How to Succeed in Upholstery."

With a slight variation, the opening could be redone for anyone who might aspire to be a corporate tax expert. The episode would be titled: "Who Would Want To Be a Tax Expert?" and the hero would arise, instead, from behind a ream of corporate tax regulations.

Carrying the humor much further would test the wit of the ablest comedy writer—if not the patience of his audience. Adding a mortal blow to any thought of frivolity in our own context is the fact that the Bell System companies paid levies totalling some $3.8 billion on income and corporate operations in 1972—by any standard, a sobering statistic. Indeed, taxes are the second-highest Bell System expense outlay. This does not even include the $1.8 billion collected in excise and sales taxes from telephone customers or the millions in taxes paid on purchases or withheld from employees.

Whatever taxes are, they're not funny. And the Bell System experts who have to deal with the kind of complexity they present would not likely be featured in a Joe Doaks movie. The comparison is summoned more for the uninitiated—all those among us who have trouble enough just getting through income tax time without suffering anything fatal. The intent here, in a kind of knothole view of corporate taxes, is to show just what one group of the System's tax professionals is up against.

Bell System companies pay taxes on plant and equipment, sales, purchases, real estate, furniture, supplies, revenues, investments, dividends, capital in addition to profit—some, or all, applied on the operation of the business in a profusion of intricately worded formulations that tend to read like a treatise on nuclear physics.

For example, here is a sample from one of the simplifications introduced in the Federal Tax Reform Act of 1969:

"For purposes of paragraph (3), an organization described in paragraph (2) shall be deemed to include an organization described in section 501(c) (4), (5), or (6) which would be described in paragraph (2) if it were an organization described in section 501(c) (3)."

Federal income tax is the largest single tax the Bell System pays, amounting to some $1.7 billion in

1972 and requiring an income tax return that makes a six-volume pile 13 inches high. Perhaps this will come as a consolation, however small, to anyone who has wrestled with the abstrusely worded formulations on standard individual and joint returns.

If this is so, then even greater consolation lies in knowing that the state and local side of the tax picture is colored by a yet wider spectrum of complexity. A closer look affords an enlightening view of this little known, little understood but vastly important area of corporate taxes.

81,000 tax collectors

State and local taxes are of utmost concern to the individual units of the Bell System—the associated companies, Long Lines and the General Departments. These are the taxes that these companies pay to state and local jurisdictions. By the most recent count there are some 81,000 taxing jurisdictions in the United States. The Bell System, while it does not pay taxes in all of the local areas, does pay taxes in all 50 states. And many of these taxing jurisdictions levy more than one type of tax.

In 1972, the Bell System paid $1.9 billion in state and local taxes, reason enough to support AT&T's decision in 1969 to establish a special section to assist associated companies in handling taxes. Operating under A. Jack Batson, director-state and local taxes, the section conducts training, statistical reporting, planning, operations reviews, and acts as a ready source of information and assistance when requested by the companies.

What is taxable?

According to Batson and his staff, the most current view of what's going on in state and local taxes is pretty much as follows:

Bell System companies (excluding Western Electric) pay corporate net income tax in 37 states and 18 local jurisdictions. In general, states utilize the federal definition of corporate net income as a starting point to determine what is taxable. Some states adhere closely to the federal formula, making minor adjustments to arrive at state income. Others, however, specify a considerable number of allowances and deductions from the federal formula while counting numerous other additional items as income for tax purposes. In the former category, some states permit deductions for certain interest income, depreciation allowances and deductions aimed at promoting desired goals, such as pollution control. A few states, such as Wisconsin, do not tie their definition of taxable income to the federal definition. Wisconsin, instead, provides extensive instructions for the computation of net income.

The complexity is intensified with states taxing the income of multi-state firms. This requires the apportioning and allocation of a company's total taxable income among the states. The purpose of allocation and apportionment of income is to attribute income to the jurisdiction in which the income arises. It is necessary to determine a source of the income in order to define the extent to which a jurisdiction may tax a corporation which is not wholly located in that jurisdiction.

Variations on variations

While this is an area of controversy at the present time, certain types of income, such as dividends, interest and sales of property, are usually considered to be nonbusiness income in many states and therefore are allocated to states (i.e., assigned directly to a specific state based on the location of the property or corporate headquarters).

Business income, or that income arising from normal business operations, is apportioned among the states generally by use of a three-factor formula (sales, property and payroll) to establish income applicable to each state. There is a lack of uniformity because the definition of each factor varies from state to state. For instance, the property factor may depend only on real and tangible property owned by the taxpayer, or may be extended to include leased property. The value of leased property may be computed under a variety of methods. As far as owned property is concerned, some states prescribe standards for setting the value of owned property and others do not.

In the payroll factor, some states may permit base pay without added earnings (such as overtime) to be the determinant; others set full compensation as the basis. And, finally, in the sales factor, methods of assigning sales receipts or revenues vary widely and may include any one or a combination of variables, including whether the service was performed partially or wholly in the taxing jurisdiction, and on to other considerations that reach down to finer and finer variations.

Property levy highest

While income taxes may be substantial, they don't approach property taxes in cost to the System. The largest type of state and local taxes by far is that levied on property. Last year it totalled $1.1 billion. This tax is determined by setting an assessed value on telephone company property and applying a rate of tax. Property taxes are generally levied on what is termed *real property* (land and buildings), and *tangible personal property* (such as telephone central office equipment, telephones, poles, lines, furniture and so forth).

Just as states vary in their determination of what is income, they vary with respect to what they consider taxable property. The foregoing definitions are general, but by no means universal. Also, the variations in arriving at a value for these things are virtually endless. Laws generally call for a fair value or true value—frequently defined as the price at which property would be transferred to a reasonably well informed buyer who is able, ready and willing but not forced to buy from an equally well informed seller who is ready, willing and able but not forced to sell. A seemingly equitable formulation, but who or what is generally in the market for a central office, submarine cable or other telephone plant?

Therefore, a number of determinants are used, like the book cost of plant, material and supplies and other tangible property. Depreciation on plant is another factor to be considered when dealing with book costs. Naturally, the cost of our construction program goes up from year to year, making our plant increasingly valuable – for taxation purposes.

Maze of ratios, formulas

Yet another method attempts to utilize the income produced by the property in determining a taxable value. The criteria that go into this method result in a maze of ratios and formulas, and these formulas frequently vary from state to state.

Further, because telephone plant is inherently complex technologically, many local tax assessors are ill-equipped to establish its value. Partially for this reason the assessing of telephone property is done by state officials in most states.

The state assessors establish a total assessment for all telephone property in the state and then apportion it among local taxing jurisdictions with those having the greater amount of telephone property getting greater assessment figures. The local jurisdiction then applies a local tax rate to its portion of the assessment and bills the company accordingly. If, as often happens, telephone property is assessed at higher levels than other property in the taxing jurisdiction, our burden is relatively higher than other taxpayers'.

Legal questions arise

"There are numerous formulas applied to the taxation of telephone property," says Batson. "The role of property taxation is currently in a state of flux. The financing of education through local property taxes is being questioned. Several courts have held that financing public education through local property taxation is inequitable–primarily because it makes the quality of a child's education dependent on the wealth in his community. The matter is now being considered by the United States Supreme Court.

"The end result will probably be a shift away from the local property tax to support education. The burden of this support would fall directly on the states, which would then be required to raise the necessary money to finance public education. Just how this would be accomplished is not known, but it's a good example of the kind of development we must watch."

Under close scrutiny is one–unfortunate, says Batson–approach to the taxation of property: *classification*. Under this method property is assigned to categories dependent on the owner or use, and differing assessment levels are applied to each category. For instance, certain classes of property may be designated as residential, farm, commercial, or industrial. Under classification, each "class" is assessed at a different percentage of true value, such as farmland being taxed on 10 percent of value, residential land on 15 percent, industrial on 25 percent and utilities even higher.

Classification considers that certain kinds of taxpayers have a greater "ability to pay" and, therefore, they should, the theory holds, pay a larger share of the total burden of taxation.

Utilities a target

Unfortunately, states generally place utilities in the highest or nearly highest tax category. One state, for instance, sets an assessment ratio for telephone, telegraph, gas, water, electric and pipeline property at 40 percent, while setting a ratio of 25 percent for commercial and industrial property.

Some have observed, of this kind of taxation, that it takes advantage of two elements: One, most utilities are committed to provide service no matter what the prevailing tax situation. Two, utilities cannot move, or threaten to move, to a new location.

In another area of taxation there is the gross receipts tax. This is the second largest type of state and local tax paid by the companies. In 1972 it amounted to $490 million. As its name implies, it is a levy on the companies' revenues–which seems a simple form of taxation. Unfortunately, this tax, too, is subject to a wide variety of formulations, due mostly to differing views of what constitutes taxable revenues.

Still other forms of taxation of substantial interest to the companies are the sales, use and utility excise taxes. While most of these are levied on the customer rather than the company, sales and use taxes generate concern to the companies because they create administrative costs in collecting them, and are a source of customer dissatisfaction.

Service taxed, too

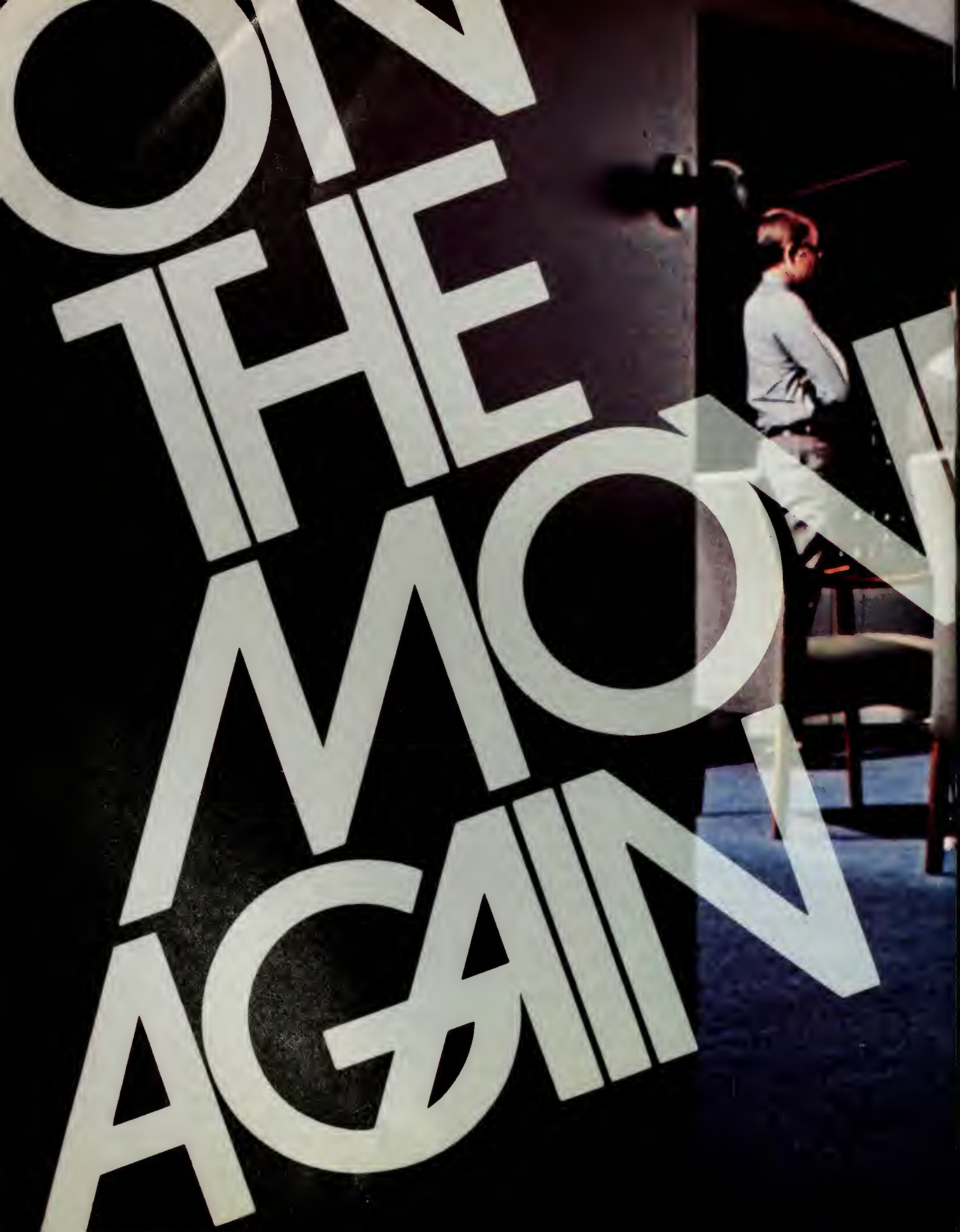
While the types of service being taxed vary somewhat in the states, counties and municipalities, some typical examples include: local service, including message units; interstate tolls, and, in some cases, coin-box calls. State rates of taxation vary from numerous lows of two percent to Connecticut's high of seven percent. Local governments in some areas also levy such sales taxes. In addition, several states permit local governments to place special taxes on local telephone service. These local tax rates vary from one to three percent in New York State to five to 25 percent in Virginia.

AT&T's position, according to Batson, is that sales and use taxes, while burdensome, are acceptable, provided they are applied fairly to *all* taxpayers. However, says Batson: "We don't wish to be singled out, or have our customers singled out, for special taxes. If we or our customers should be singled out, then we both may be paying a disproportionate share of the tax burden within a particular state or municipality.

"We stand ready to pay our fair share," Batson says, "but we will be doing our best to see that it's no more than our fair share."

There are other forms of state and local taxation that Batson and his staff and colleagues at AT&T and in the associated companies keep under close scrutiny, ready to take those actions that may be necessary to assure that the System's share of tax responsibility remains equitable. The foregoing provides a small idea of what's going on in state and local taxes . . . even though you never asked. □

ON THE MOVE AGAIN



What kind of shape is this business in? Are we headed in the right direction? What are the things we're especially concerned about? Competition? Service? Earnings? Change? Managers across the country were asked to provide their views on all these matters—on anything they felt to be significant, not only within the area of their personal responsibilities, to which they brought a strong sense of "proprietorship," but as part of the internal force that moves and shapes the whole undertaking.

As might be expected, opinion was rarely unanimous on individual points. For example, some felt that young people coming into communications were not as motivated as they used to be, nor as well equipped for the job. Others, the majority of those discussing the matter, felt that there has been no essential change across the generational divide in attitudes toward the "work ethic," that young people just tend to question more than their predecessors did.

Some felt we should be improving our earnings situation by still more vigorous effort in making our case with the regulators; others felt that what is really needed is the introduction of a whole new philosophy of pricing.

Some felt our research should venture even further into those untracked regions where the wholly new might be found, breaking through to unique and unprecedented discoveries that would establish new eras in communications science and technology. Others felt we should focus our abilities more on what has already been achieved, mining for refinements to meet the practical needs of the moment and the near-term, predictable future.

And so it went. But constantly recurring was the expression of overall confidence in our prospects. No matter what the challenge, from within or without, everyone felt that the System would render a good account of itself. And that understates the general response, a response that unfailingly reinforced the impression recently conveyed by the Board Chairman after extensive visits with management people, at all levels, from one end of the country to the other. As he put it at the time: this business is on the move again. Or, as a division sales manager phrased it in one of the present interviews, describing his own company's expanding mood: "It's one hell of a change!"

As the discussions were unstructured, conversational, pursuing no ordained conclusions or consensus, we've abstracted those themes that emerged most frequently, grouping some of the related remarks around them. There were far more themes than those recorded, of course; more managers interviewed than those featured here; and a much wider and richer collection of statements than these excerpts can possibly represent. But what we hope is that they will help identify the spirit at work among the people directing the efforts of the million men and women who are the tributary elements of this ongoing, and apparently resurgent, force known as the Bell System.

EARNINGS FINANCE REGULATION

Rate increases are not necessarily the long-range answer to the earnings problem. When we go in for a rate increase, we're looking to the past; we're looking to catch up. The regulators generally say they can't look at the future; they work with what has already happened, with established facts. So the best they can do is fix up a past problem. We've got to find some way to work out a regulatory approach which will recognize future costs and revenues. Then we must develop a rate structure which will enable revenues to increase proportionate to costs.

KENNETH SCHNEIDER
General Rate and Traffic Manager, Mountain Bell

I feel a real sense that we are moving into an era when financing will be as critical a challenge as it was at the end of World War II. If we cannot fulfill our financing needs, we're not convincing the public that communications is as important a resource as we believe it to be.

Certainly a major challenge we have is to get earnings up. We're doing a lot of innovative thinking. As an example, we're taking a look at usage-sensitive pricing. In a way, that sort of examination gives me optimism. It shows we're not strapped in by traditional practices if those ways don't make sense in these days.

DON LAMONT
Assistant Comptroller, AT&T

Schneider

Lamont

rison

n

Denmark

In order to continue attracting capital, we have to improve earnings. But I don't say that this just means rate increases. There's a lot we have done and will continue to do internally to improve efficiency. On the whole, though, I'm optimistic because our earnings are improving. We've had good relations with our utilities commission here for some time. We've had an intelligent, interested group of commissioners who've been willing to listen to our problems. In fact, I sense a better understanding on the part of utilities commissioners all over the country.

ROBERT E. ALLEN
Vice President, Secretary and Treasurer,
Indiana Bell

SERVICE

From my view, we're taking a giant step forward. We're developing new approaches to managing by objective. And our overall objective is to serve the customer better. In the past, when an area grew too large in terms of customers to be served, we simply split it up into more of the same kind of organization. We're no longer doing that. Instead, we're expanding responsibility for given functions; for example, network management, customer service, and so on. We're not restricting ourselves to neat, geographical boundaries anymore.

JOHN G. HARRISON
Switching Personnel Supervisor,
Pacific Telephone

Most of us have a tendency to assume that yesterday's solutions will fit today's problems, and so we try to solve yesterday's problems. On the matter of public ill will, the best way to diminish it is to provide, over the long run, consistently high quality service. While I am concerned with revenues, in the final analysis service is what the job is all about.

THOMAS C. DENMARK
Assistant Vice President,
Regulatory Requirements, Illinois Bell

If we can deal with the inflationary bias in the economy and the regulatory problems this presents to a utility, then with the technological revolution we're experiencing in communications and a reasonable regulatory climate, the future of this business should be excellent.

VIRGINIA DWYER
Corporate Economist and Actuary, Western Electric

Dwyer

About 18 months ago, our construction productivity and cost performance left a whole lot to be desired. One of the chief factors was a communications break that we sensed existed all along the line to top management, so we increased the amount of face-to-face communications. We decided to conduct standards-setting sessions with each construction management person in the entire area. Top management in each department spent an entire week with each group of about 15 foremen developing service, productivity, and cost objectives. We talked in terms of specific goals and the obstacles which had to be overcome to achieve these goals. Next, we developed action plans. By the end of the first quarter 1972, things really began to move. Now, several of these construction groups are on the verge of competing with the best Bell teams around, while the area achieved a 21 percent increase in total construction productivity for the year 1972.

We believe we have a workable system for improving results, a system that enables management in every department to focus on quantifiable objectives. And we hold each manager accountable for meeting them.

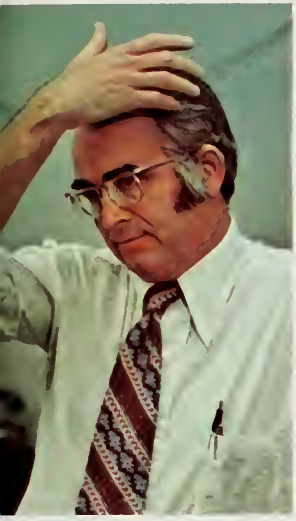
LAWRENCE J. BARNHORST
Vice President and General Manager,
Western Area, Bell of Pennsylvania

If we can convince our customers that their satisfaction with service is contingent upon our realization of a fair return, we can relieve some of the pressure on the regulators. There are obvious problems, here and elsewhere. You have to have adequate rate increases to sustain the proper level of service performance and to maintain sufficient earnings that will attract the enormous amounts of capital required. Naturally, you have to do everything that is possible internally, too—holding down expenses, pursuing every prudent business practice, and so on.

Overall, I'm confident about the future. It may require changes in this business, but I think it can't be anything but bright. Look at our organization—research and development, manufacturing and operations—all working together. With that kind of structure, all you need are good, capable people to run it, and I see that in abundance in this business.

A. MAX WALKER
Vice President and Treasurer, Southern Bell

Barnhorst


ncer

ker

Verspoor

Custy

COMPETITION

Times have changed for marketing people today. We used to deal with a company's communications representative in the past. Now we deal with their financial people, so we've got to learn to speak in terms of discounted cash flow analysis, tax rates, depreciation, maintenance costs, cost of money, and so forth. We're becoming a lot more sophisticated in evaluating what the actual total costs are for the customer to acquire non-Bell equipment as compared with retaining Bell service. And we have a Bell team concept. The strength of the System is something no other company can offer, and I don't think they ever can. There's backup from Long Lines, the data communications field, Bell Labs and Western. The one supplier concept—one vendor—to take care of the customer's total communications needs has got to be our greatest strength.

JOHN VERSPOOR
Division Sales Manager, Michigan Bell

It's one thing to be able to design transmission and switching systems; it's another to be able to sense customer needs. We need to concentrate more on learning to utilize the technology we have rather than looking for new ways of doing things. The Japanese are quite adept at concentrating on designing something useful for the customer without achieving a technological breakthrough. They determine a need and they satisfy it without a lot of whistles and bells. Our strengths are our size, our people, and our technological capability. We're in better shape with the Denver concept, even though it's not up to full potential yet. The physical proximity that we have with AT&T and Western is of great value. It fosters the project or team concept.

AL SPENCER
Director, Denver Laboratory,
Bell Telephone Laboratories

We are part of a total Bell System team at Denver. Our responsibility as manufacturing managers is no different than at any other Western Electric plant. We have got to supply the operating companies with the hardware they need to serve their customers, but competition has changed the time frame. We have to cut development and manufacture time by as much as 50 percent. In fact, on some items, we have cut the cycle to 18 months where it used to take seven years.

JACK CUSTY
General Manager, Denver Works,
Western Electric

CHANGE/ INNOVATION

There are many new considerations that go into constructing a telephone building today. We work as closely as possible with governmental agencies and environmental and community groups to provide buildings that are wholly compatible with their setting. For example, in a switching center in mid-Manhattan, we've agreed to provide space for retail shops on the ground floor and we're planning to include a pedestrian mall as well. These considerations sometimes make it difficult to get a building up in a reasonable time frame, but we're meeting the challenge.

JULES SANTOS
Engineer of Buildings-Planning,
New York Telephone

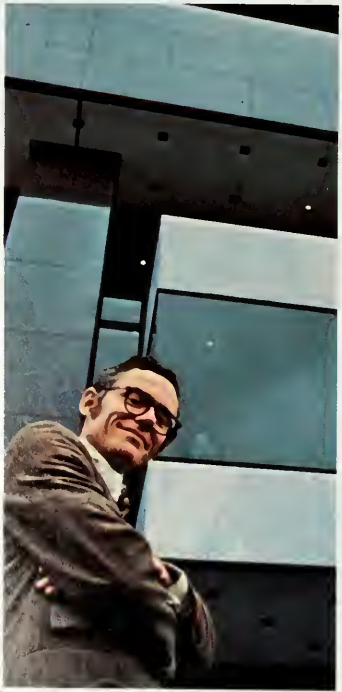
The changes that have come about in this business in just the last few years are unbelievable. We have bright, imaginative people who are not afraid to try new things. And it isn't just the younger people. Some of the older managers exhibit a willingness to innovate and experiment. We're doing things, using new management techniques with modeling and research, for example, that others aren't. Maybe we're not doing enough of it yet. But when I go to conferences with businessmen from other companies, they're flabbergasted at how far ahead we are.

JACK B. HUBER
General Revenue Supervisor,
South Central Bell, Birmingham, Ala.

How do you get a guy to think about his job—that's the challenge; that's one of the things you look for in a manager. The fact is, today the manager has to be a leader and not a boss. Young people won't respect a manager because of his title. Today, you win or lose in a pressure situation where they can see how you handle it. If they see you're willing to work for them, they'll work for you.

TOM FARMER
Division Plant Manager, Ohio Bell

Santos


Huber

Farmer

Moorehead

Some of the newer people are highly motivated and want to do a good job. But they need a good job to do. I think we ought to be at least as concerned about that aspect of it as anything else. I give them an assignment and say, "Go to it; come and see me if you have a problem." But I give them their heads. I enjoy people who are good technicians. It's fun to have someone who's not only capable, but excited about the job as well.

ANGELA M. LANDRY
Computer Systems Analyst,
New England Telephone

Tomorrow's needs are unique and more demanding than ever. Yet it takes people to pull off better service, get earnings on track, and tackle competition. The name of the game is still people. The company has shown it's willing for managers at the bottom and the middle to make decisions. And from what I see of the top people, they know what they're doing. If their personal dedication is multiplied–if you and I are caught up in it–it's got to click. Everything I see involves change and resistance. But I see change. From what I see, our management is concerned with people.

HERB MOOREHEAD
District Information Manager, Ohio Bell

There is an urgent need for managers to be contemporary, to become attuned to the changing value systems of young people. Unless we're smart, it will plague us as it does other companies. We've got to begin accommodating value systems. Now that doesn't mean giving in; it means understanding the world as it is today.

AMY HANAN
Personnel Director,
General Departments Employment
and Training, AT&T

A Gathering of the Owners

Like everyone else, they come in all sizes, shapes and colors, from all over the globe. And as investors in this business, they expect an accounting from us.

At AT&T's annual meeting in Denver last year, one of the share owners, a young lady, paid a very nice, if unpremeditated tribute to the versatility and customary helpfulness of Bell System people. Not to mention their composure. On arriving, she went directly to the coat room where she checked her slicker, her umbrella, and her baby.

Scout's honor. She told the Mountain Bell people there that the little fellow was fed, dry and manageable, and went off, perfectly reassured, to participate in the proceedings that had just begun. While there has always been a certain sense of "family" about these gatherings, probably never before had one ever provided such a practical demonstration of it.

The family will be gathering again very shortly, of course, and there is already something noteworthy about it all. It will be a return engagement to Chicago, to the site of the very first such meeting ever to be held by AT&T outside New York. (The date is April 18; the spot, the Arie Crown Theatre in McCormick Place.)

As a New York corporation subject to New York law, AT&T was originally required to hold all such meetings in its corporate home state. The law changed more than a decade ago, and AT&T was among the first of the New York companies to venture out. That was in 1961, and Chicago proved a fine selection; it all went off very nicely.

This will be the tenth time AT&T has held its annual meeting outside New York. Other host cities have included Denver, Dallas, Cleveland, Philadelphia, Detroit, Baltimore, Boston and Atlanta.

As is probably not surprising, a geographical representation of the AT&T share owner population would be heavily shaded in the eastern regions.

More than 75 percent of the people who own AT&T common stock live east of the Mississippi River; more than half live in the Atlantic Seaboard states.

The eastern group of states, which includes New York, New Jersey, Pennsylvania, Delaware, Maryland, District of Columbia, Virginia and West Virginia, contains nearly a million and a quarter people who own the company's stock—who own, in fact, more than 45 percent of the common stock outstanding. Another 10 percent of the owners reside in the New England states, and a similarly large group is found in the southern states of North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi and Louisiana.

Nearly half a million share owners reside in the central area states of Ohio, Michigan, Indiana, Wisconsin and Illinois, and together they own more than 74 million shares, or something more than 13 percent of the common stock outstanding.

Illinois, with nearly a quarter of a million share owners, ranks fourth—after New York, New Jersey and California—in the list of states

with the highest population of AT&T share owners.

While California ranks high among states with a large owner population, other western states do not. Less than three percent of the share owners live in the Northwest, a little more than six percent call the Southwest home, and the Mountain group, which includes Montana, Wyoming, New Mexico, Idaho, Utah and Colorado, claims fewer than three percent of the owners.

While more than 99 percent of the owners live in the continental United States, some 3,500 of them live in Hawaii, 750 in Alaska, and nearly 1,000 in Puerto Rico, the Canal Zone and other U.S. possessions.

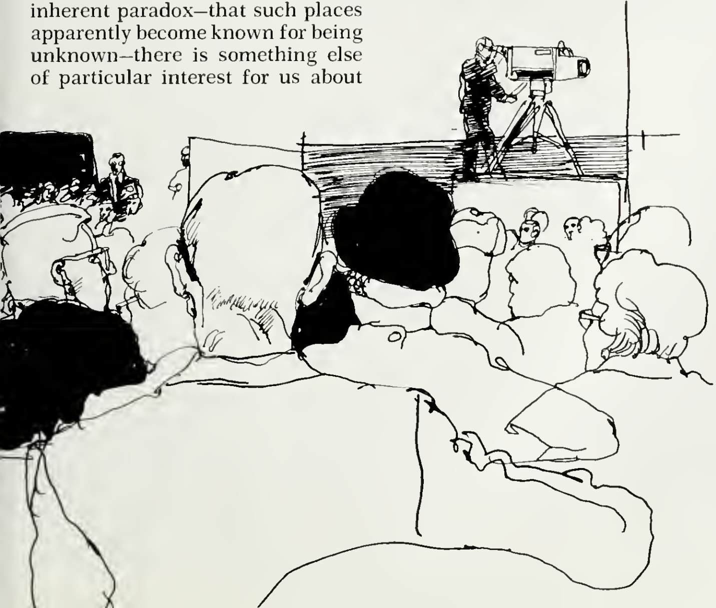
Less than one percent of the owners live in foreign countries, but their holdings of more than eight million shares are significant. As you might expect, our northern neighbor, Canada, leads the list of foreign countries having large numbers of AT&T share owners. Of countries having 300 and more owners, ranked in order after Canada come Germany, England, Italy, Ireland, Switzerland, France, Greece, Israel and Mexico. Places you've all heard of, of course.

But without looking at a map, where would you locate the Trucial States, Surinam, Dahomey, Malawi and the Seychelles? Apart from the inherent paradox—that such places apparently become known for being unknown—there is something else of particular interest for us about them. Each of these countries has a single resident AT&T share owner. So, not only have they helped extend our knowledge of geography, they have helped support our business. (Incidently, those locations are, respectively, Southeast Arabia, South America, Africa — for both Dahomey and Malawi — and the West Indian Ocean.)

Other places which claim a single AT&T share owner resident include Cambodia, Singapore, Greenland, Angola, British Guiana, Paraguay, Albania, Crete, Iceland, Algeria, French West Africa, Ivory Coast, Madagascar, Mozambique, Sierra Leone, Southwest Africa, the Sudan Republic, Tanzania and Zambia.

Of the AT&T share owners who tend toward sea and surf, one each lives on the British South Solomons, Wake Island, the Caroline Islands, the Mariana Islands, and the Marshall Islands. That is, we *presume* they tend toward sea and surf. It may very well be, of course, that they have the same romantic regard for the concrete and asphalt of the more congested civilizations that we harbor for the long rollers and the untracked sand of their legendary shores.

Of the entire AT&T share owner population, women continue to outnumber men by nearly two to one. More than 1,120,000 women own the stock outright as individuals, and another 933,000 own stock jointly with their husbands. Only a little more than 606,000 men own stock in their names alone. While there is concern for liberation or equality in other areas of our national life, that statistic could suggest that in the AT&T family, at least, women are clearly in the catbird seat.



Other data show that nearly 80 percent of the AT&T owners own less than 200 shares of the company's stock; that more than half own less than 60 shares; and that a third own 20 shares or less. It's plain to see, therefore, that AT&T shares, once labeled the "Widows and Orphans Stock," are not only the most widely held in the nation, but are held primarily by Mr. & Mrs. Average Citizen.

The fact that so many hold small blocks of stock in no way diminishes their interest in the way the business is run. Far from it. Unlike some other companies, the vast majority of our share owners are also customers of the business, and they have a double reason for wanting the company to be run efficiently. When annual meeting time rolls around, they make those wishes known. Where other companies' annual meetings may last an hour or so, AT&T's have been known to run five, six, and seven hours.

One of the prime reasons for holding an annual meeting, in addition to electing a board of directors, is to provide those attending an opportunity to secure pertinent information about the operation of their company. Reciprocally, of course, it provides the company and directors an opportunity to receive suggestions, impressions, and so forth, from the owners.

And so, male or female, young or old, tall or short, all bonafide owners of company stock attending the annual meeting in Chicago this year will be given an opportunity to discuss relevant matters with their company's officers and directors.

The facilities will be staffed by Illinois Bell people who are every bit as hospitable as their Mountain Bell counterparts, but who will no doubt be watching somewhat nervously from the coat room for a young lady with a baby. ☐

In what was essentially a "letter to the editor," New York Tel's Al Wood makes some pointed comments on employee communication. Drawing on 18 years' experience, mainly in plant, he says that the principal barriers to its effectiveness are the "myths" of

The Open Door, The White Knight, The Wrong Preposition.

To get a grasp on a workable employee communications program we must first dispose of three myths that block effective communications. They are: the myth of the "open door;" the myth of the "white knight;" the myth of the "wrong preposition."

The first myth is crucial. It centers around the self-delusion that we're all "good guys;" "my door is always open;" "you can talk to me." The truth of any large organization —made up of good guys or bad—is that the organization works against fast, accurate, open communication.

If you want to know the number one problem of any large organization it's simple to find. It has nothing to do with the obvious, day-to-day problems of running the business: capital money markets, expense budgets, or hiring practices. It's what keeps the door closed. It's "fear of the boss." Nobody in an organization wants to be the bearer of bad news. And bad news has no way to ascend our multilayers intact. The message that starts out, "We were wrong, the Business Office Rep goofed," is a two-page report with corrective programs attached by the time it filters up six to eight levels to the top officer concerned. It can not and will not survive in its original form. Recently *The New York Times*, in an article on military credibility, said that "armies and corporations alike have ways of sweetening the news as it ascends the hierarchy of command." The reason: an inherent, deep-seated, built-in, "fear of the boss." It's hard to face up to, but this Company of good honest men—and that's predominantly what we are—is an organization with its share of "fear of the boss."

Of course, this has nothing to do with personal fear. It's a fear of what will be the reaction "upstairs" by "they" as the message filters up. Experienced supervisors know that retribution is directly proportional, and understanding inversely proportional, to the number of levels above them in the organization. The cause: size.

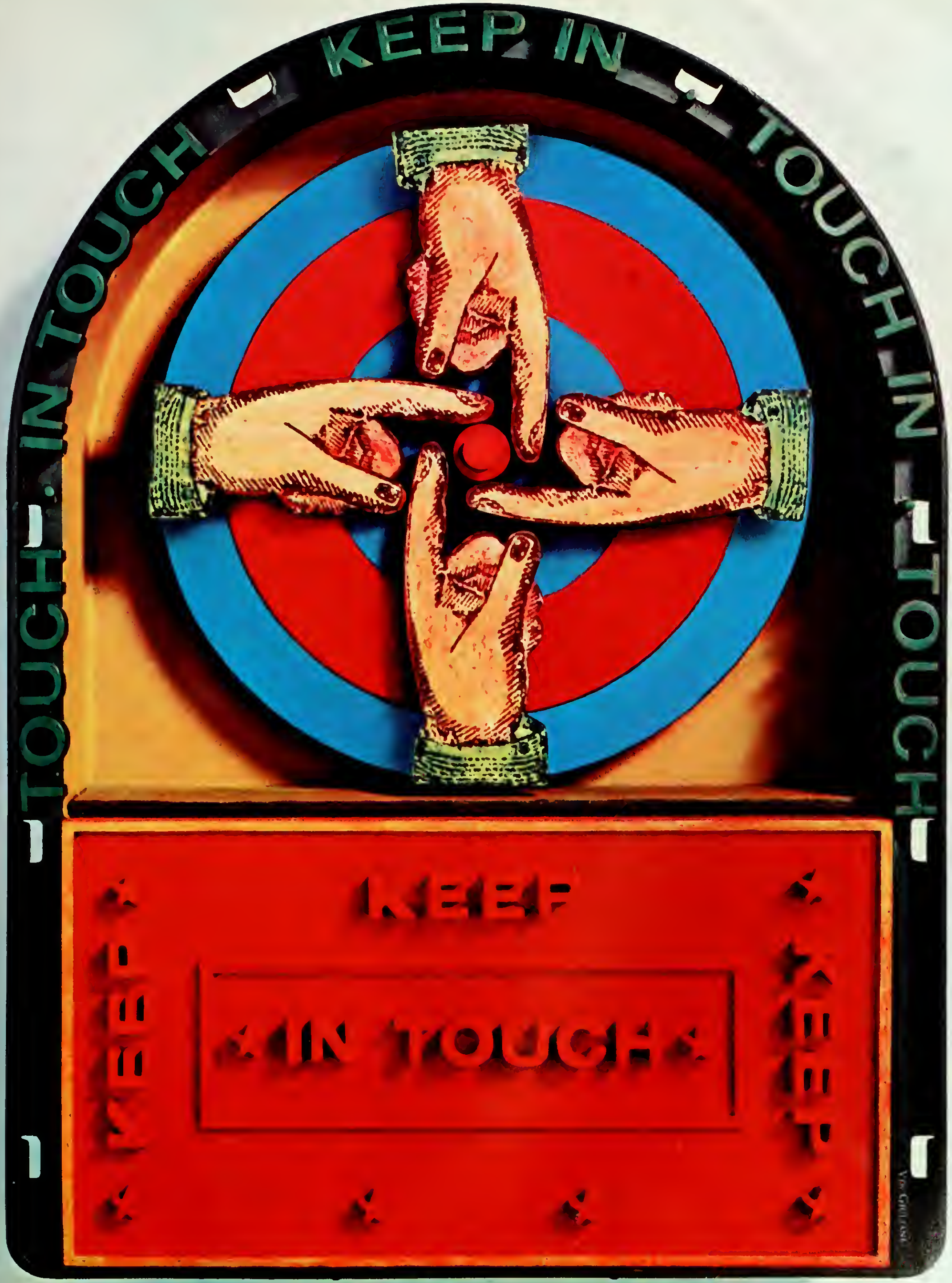
To communicate we must recognize bigness as our main problem. Our goal—an environment where bad news flows up and down the channels with the same alacrity as good news.

To dispose of "fear of the boss," we must be alert to its presence. No matter what self-image tells you, be aware that the people who work for you may be afraid to speak openly for fear of risking displeasure. The District Accounting Manager sending a critical memo down the lines of organization blasting the work of an Order Room Clerk, is not communicating. In fact, he's a communications block. A boss who does not know this will never become an effective communicator.

The myth of the "white knight" is not Bell System property. It's an illusion shared by politicians and most organizations. It's the myth that says when you have a trouble spot, send in a "white knight." He will raise results, reduce costs, turn employee attitudes, solve all problems and be on his way—all in 12 to 18 months. Well, it ain't necessarily so. How much charisma can a leader have? How far down the organization can personal leadership reach? Here's a key truth of employee communications: the charisma span seldom exceeds two levels of organization. Your boss's boss is generally the "big boss" to you, regardless of your level. Who sits above the "big boss" is of little interest and clearly his personal impact is small. Want proof? Stop now. Ask yourself, "When is the last time I saw, spoke to, or spent any time with a supervisor three levels above me?" It's a rare manager who answers, "This week."

The universe of charisma, the battle ground of the "white knight," is two levels. Two up and two down. This is an important point. There's a fantasy in the Bell System that a Division Manager who can't address all the Representatives and Clerks by their first names, and who is marked "unknown" on employee attitude surveys, is not doing the job. Hogwash. They're surface indications of nothing. Basic communications is done in the two-level zone. Anthony Jay, in his book, *Corporation Man*, states that man is incapable of really communicating in groups of over 500, although his performance nonetheless affects communications. Jay calls these groups "tribes" or "communities." He warns us that communications only takes place in communities. A "break-down in communications" is just another way of saying the community is breaking down. Our community is big—one million employees. We need communities we can handle. The two-level one is ideal. This is hard on the "white knight." It means he must concentrate his efforts in a smaller zone.

In addition, the "white knight" has to stay around for a while to be effective in the two-level zone. Given the assignments: change the index, reduce costs, improve employee attitudes—the "knight" can do the first in a matter of weeks. The second in a year or two. In three years he may just be making a dent in the last. A Bell System officer famous for his charisma at Division level once said, while looking at a printed results book, "Don't forget there isn't a number in that book that I can't change with a ten-minute meeting. Now let's talk about how you're going to manage this outfit." He was right, his point simple. Anyone can manage for narrow results. Managing for short-term results is seldom good management. So the myth of the "white knight" tells us two things about employee communications: con-


TOUCH. IN TOUCH. KEEP IN TOUCH IN TOUCH IN TOUCH
KEEP
KEEP
KEEP
IN TOUCH
V. GIULIANO

centrate your efforts; stay around a while.

The final myth, the "wrong preposition," should prove obvious. For years Employee Information has meant *to,* not *from*, the employee. Anyone who has labored for hours over a single paragraph in an employee publication knows the problem. We have good writers in the Bell System. Not one of them can produce a paragraph on Equal Opportunity that reads the same in a manhole in Chicago, a computer room in Denver, an installer's rig in Oil Trough, Arkansas, or an operator's lounge in Brooklyn. It may be a great statement, but until the boss comes out, sits down, talks about it, listens to what comes from the employees, it has little impact. Efforts to talk *to* the employee should continue. But let's have equal time and money for *from*.

This may be hard on the professionals. It says a Vice President talking to a Public Office Manager at an Open House may not be communications at all. It says an employee newspaper may interest only those mentioned in it. It says a President's speech at the local Chamber of Commerce may be read only by its author. It says employee communication is the basic responsibility of the boss. There's no substitute for talking with the boss—*your* boss.

Let's develop a communications model for a District Superintendent. The model inputs are simple, not original; but if applied for a period of time, by a sincere supervisor, they will produce results. Where are the results measured? In the same place all results are measured: installation intervals, report rates, productivity, absence, plant sales, and in the gut of the supervisor and craft.

A warning: don't look for immediate, measurable results. Don't even look for a direct line of cause and effect. Certainly don't look for personal glory. They are not the objectives of employee communications. Employee communications can be pure frustration, certainly pure effort, but it is not thankless work. The payoff of such effort is in the improved performance of people over the long pull, something that will positively affect everything they do.

District Superintendent's Model

Input #1

Once a month, without fail, have breakfast, coffee, or lunch with each supervisor and his or her immediate subordinates. A separate meeting for each group reporting to you. It may be at the best restaurant in the district, it may be sandwiches under the trees in a local park, it may be a "brown baggers association" meeting. Whatever it is, it should be a session where you can talk freely about the business. A guest can be invited as well. The local Commercial or Accounting manager, someone from Personnel, anyone who might provide helpful information in informal discussion. After the meal, over coffee, try going around the table, making a specific comment of a personal or local nature to each of the assistants. Something like, "Helen, how are things in your group?" Or, "Joe, is there anything I can help you with?" The first meeting will be dead silent and last an hour. The 15th meeting will go three hours. Three hour lunches! Your company can't afford them—but you can't afford *not* to have them.

Input #2

At least once a year, meet with each supervisor's group for a safety seminar. In the field, at a work location, if that applies. In Plant, for example, assemble all the safety tools—the B-Voltage Tester, gas detector, rubber gloves, ladders, eye protection, hard hats, and so on. Select a pole location and set up a drop-wire reel. For four hours the group demonstrates how to use the gear. Hangs off the pole together. Ties bowlines and talks safety problems. Box lunch is served and the meeting ends. Incidentally, this meeting takes the place of the one usually held after there is a serious accident.

Input #3

No supervisor in the district should have a birthday without a personal call from you. Simple—basic—you bet. But have you ever spent a birthday in an organization where nobody even gave a damn it was your birthday?

Input #4

Reserve a few minutes one day a week for a drop-in visit by a supervisor. Results should NOT be discussed. Just coffee and small talk about the business, the job, the community. A chance to relax in the district office and get acquainted. Is there any reason that throughout the Bell System the district office is often as remote as Xanadu? After all, if we believe in the open door, it's nice to know where the door is.

Input #5

At Christmas, NEVER a pre-printed card. A personal handwritten greeting thanking the supervisor and the assistants for their help and wishing them a happy holiday.

Input #6

The Bell System hasn't done much for the prevention of accidents by making them a sin. Each quarter, the employees who have had accidents, and their supervisors, should join you in your office for an informal discussion. You can start the meeting by describing a past accident you've had in your group. No fault or blame to be ascribed. Then, let each accident victim talk about his incident. No criticism should be allowed. Just an open discussion of how it happened, and what can be done to prevent it from happening again. Try it, it's amazing the communication that takes place.

Input #7

The personal note or letter is the most underrated and least used communications technique. No promotion should go by without a congratulatory note. No perfect attendence record should go unnoted, no family honor uncelebrated. In addition, the district level should feel free to write corporate letters on what's going on in the district. When there is a major change in a company policy, a local problem in service or results, a local letter tells the troops how it affects them. Lawyers and public relations pros who quake at this suggestion, remember: 90 per cent of effective communication in the Bell System is done "out behind the truck."

Input #8

Anytime there is a problem between groups—for example, installation and repair, assignment office and commercial, traffic and central office—bring the key supervisors together in a two-level, "5X7 meeting." Each participant writes a key problem or gripe on a 5X7 card, without signing it. You then read out the cards and monitor the discussion.

Input #9

Never let a deserving employee's long-service anniversary pass without going out and taking his or her job for half a day. At least, wherever that is at all possible. That's right, go out to the garage, climb in the truck and do the installer's job for at least half a day. Joe Smith, installer, has been doing it for 40 years—for once let him watch you do it. By the way, listen to what he has to say.

Input #10

Once a quarter, on a formalized basis, run a "skill-sharpener" school. Again, working through your supervisors in an off-the-job environment. Some suggested subjects: What is a supervisor's responsibility to his people? What is supervision? How do you handle the "tough" case? What's the future of the Bell System?

Input #11

The two-level group is a community. Nobody should enter or leave it without personal contact with you in a "special events" meetings. Special events include: the arrival or departure of a supervisor; promotion into the group; leaving for or returning from special training schools; loan outs to other districts; special assignments for studies, and so on. All require a talk with the boss.

Input #12

When a trouble spot develops, when there's a new campaign, program, or change, you should get out in the field yourself and confront it as a personal challenge. For example, if production is poor, pick up an installer and show how the job can be done better. If you fail, you'll still learn something very important. In any event, you'll garner respect. "Tell and show" is superior management to "tell and ask for report."

There's the basic model. Simple inputs—all aimed at one thing: developing a two-level group that talks, laughs, hustles, works, and produces without "fear of the boss." This model forces the boss to be available, to listen, to be visible. A model like it can work in any department or level: Commercial, Accounting, Traffic, Staff Head, Vice President. It takes one thing: you have to get out where the action is.

One objective remains — turn around the preposition. What magic can get employee information out of the *to* and into the *from*? There is already a Bell System answer. It has been around for years. It's a regularly scheduled, all hands, never superseded, weekly ride-with. What is a ride-with? You'll find it outlined in dozens of departmental quality control plans. You'll find it taught in management training courses. It's very simple: one day a week, every week, throughout the Bell System, managers will get up from their desks and get out in the field on a formalized basis. They will spend an entire day with someone on a lower level — preferably a non-management employee. The only way to escape a ride-with will be if you are selected for a ride-with by someone above you in the organization. Here we may breach the two-level zone. But the objective is to turn the preposition. The more we hear from those further down, the better.

Specifically, a ride-with can be a Commercial Manager, with a headset, sitting all day at a Rep's position. Helping her post her stubs, helping her file, listening to every customer contact, and listening to the Rep. A ride-with in Accounting is an Accounting Staff Supervisor working in the AMA tape receiving room, all day, listening and observing the operation. In short, a ride-with is everybody out in the field, hands-on, one day a week—communications and management in its purest form.

Sound simple? It's one of the most difficult things you have ever tried. Ride-withs challenge and test us as managers. They force a confrontation with the realities of the field. Ride-withs make us face up to how practices and theories meet the test of the field. A ride-wither has to look at that crowded terminal, listen to that unhappy customer, share the abuse of the "A" board.

Yet for all this, a ride-with is an exhilarating experience. Operational review and local management people who have done some riding tell you that they seldom go on a ride-with that they don't meet someone interesting, learn something significant, and see a major improvement that should be made in the operation.

What are the benefits of this effort? For one, ride-withs increase productivity. Part of it is the result of just showing that you are concerned; part of it is working smarter; part of it is working harder. But the increase is there. Ride-withs make us look at the non-productive part of the job. An outsider looking in always has questions about the value of some of the daily work functions. But most important, ride-withs let us spend a full day with a fellow telephone employee. The value of that contact must not be underestimated. You will never forget anyone you have ever spent a day with on a ride-with, and that employee will never forget you. That's employee communication.

The ride-with does much more than reverse the preposition. A true ride-with helps break down the organizational pattern that has brought us to a state where we write to the organization, report on the the state of the organization, audit the functions of the organization, but seldom talk to one another. More dial tone is found by going out to the field and looking for it than by going to a facilities meeting. When we learn that, we will have good communications and, as a bonus, outstanding service.

If we open the doors, unseat the "knights," and start to "ride with," employee communication will not be a major problem. To those who ask, "How do I do all these things and my regular job?" the answer is simple: "What is your job?" □

Lines headquarters staff supervisor in overseas services said, "My job was to make the best use of the facilities we'd provided. I had to decide, for example, how circuits should be divided between incoming and outgoing calls. Also, because most of the billing equipment was inoperable, calls to the United States were collect only. It was easier for the American operators to handle that end of the business."

In addition to assisting in telephone restoration, Navas carried out a personal mission for a Long Lines employee whose immediate family and relations lived in Managua. Navas related the unhappy details. "The houses of the relations were in the center of the city and had been completely destroyed. Everyone lost their lives. It was a sad moment for me. I never felt so helpless. But the immediate family was luckier. Their house was in a different part of the city, and was still standing. But there was nobody there, and I couldn't find out where they'd gone."

Navas had a commercial radio station broadcast an appeal to the family, asking them to get in touch with him through the local telephone company. Two days later there was a response. The family, along with thousands of other homeless refugees, had fled to the nearby town of Masaya.

"I went to the town to tell them to call their family in the states," Navas said. "I found 10 of them living in one room. But at least they were all alive."

The Southern Bell Story

"We were there a week before we saw any one smile," said Louie Atkinson, plant staff supervisor.

Louie was one of five Southern Bell men on the telephone team. The others were Harold Hawkins, supervising service foreman in special services who was in charge of the Southern Bell group; William Buchanan, special services television foreman; Robert Day, service supervisor, and Watson Stallworth, supervising installation foreman. All five are from Atlanta.

"Most of the survivors lost everything they had," Atkinson said, "but they seemed to take it all in stride."

Hawkins said the team worked 16-hour days for the 23-day period it spent in Nicaragua. He credited Nicaraguan telephone people with like determination in working alongside the Bell team to help restore some of the communications.

"One of the hardest jobs," Hawkins said, "was getting equipment transported from where it was to where we needed it, because the roads were all littered with debris."

And, if that wasn't enough, the occasional after-tremors added some moments of drama. Describing his impressions, Hawkins said, "It was weird. I was installing a phone in a room piled high with supplies when the tremors started. Everything was shaking. It felt as though the earth was caving in around you. My first reaction was to get out of the building, but the Nicaraguans hardly paid attention. Later they told me it's easy to tell when there's going to be a tremor. You always hear a rumble in the air first, and then the ground starts to shake. I'd have to live in Nicaragua a long time before I got used to that."

The crew shared its rations with the quake's victims. "We knew we had limited rations for ourselves," Hawkins said, "and we knew we'd have to go find more, but they needed food and water and we did what we could to help." In one act of assistance, Hawkins and his men hauled 55-gallon drums of water in a line truck to a hospital.

Hardships notwithstanding, the five said they would willingly relive their 23-day mission because they found it satisfying and rewarding to help people who needed it.

Even Stallworth, who had spent some anxious moments in detention, said he felt good about helping out. His anxious moments came when he was arrested by a Nicaraguan soldier—toting a double-barrel shotgun—while trying to drive supplies through streets jammed with rubble, traffic and refugees.

On the alert for looters, the soldier ordered Stallworth over and told him to get out of his truck. "I tried to explain who I was and what I was doing," Stallworth recounted, "but I couldn't understand him and he couldn't understand me. So, I ended up going with him to headquarters. I was there for half an hour with a lot of other people when Harold Hawkins showed up for the rescue."

When the seven left at the end of January, the Nicaraguans were well on their way to restoring communications. Said Long Liner Mahony, "Our greatest feeling was satisfaction. We were there to do a job and we did it." His feelings were endorsed by the whole team. ☐

EDITORIAL

Renaissance

Maybe it's just that time of year, but things seem to be perking up; there's more sass and spirit. As this issue goes to press, it's March/April: the time of the roaring lion and the mildly departing lamb, the time of growth and promise and of all that business going on underground and then flaming out like . . . well, like Spring.

The last time we looked, this season traditionally was announced by such events as the swallows' return to Capistrano. Also, with an admittedly slighter hold on popular sentiment, by the buzzards' return to Hinckley, Ohio—from wherever it is that buzzards tend to winter.

In short, there's always something in the air around this time of year, something that encourages celebration. And we're pleased to note just now that this season of lively expectation seems to have come upon an answering mood in the Bell System. The feature on the Managers in this issue, for example, has weighed the evidence of eyewitnesses and returned the judgment that we're on the move again.

Quite a few factors might account for the change. One of them would have to be that renewed sense of proprietorship we're hearing about—that spirit of personal responsibility voluntarily extending itself.

Fortunately, this business is structured along lines of tradition that have always held the people-to-people relationship as one of its most prominent features and strongest resources. (Is there anywhere an organization of such size and complexity in which personal relations are more easy, informal, cooperative, wherever you might find yourself in that organization, at any level, from one end of the country to the other?) And that enduring tradition has spared us much of the buffeting that rapid social and technological change has sometimes inflicted on other companies.

To telephone people, so thoroughly committed to service, relying to such an extent on the coordinated interaction of so many elements, that sense of proprietorship—of making not only a contribution but a difference—is unarguably crucial. We don't think it has ever really been lost in the Bell System, even though recent difficulties and turbulent times for the whole society may have appeared to strain its reserves. Indeed, what emerges from the massive effort—not merely to regain our wide reputation for excellence and pride of service, but to enlarge it—is that the spirit of individual commitment is being seen even more clearly as the hinge on which the whole enterprise turns.

In itself, unaided, that spirit may not solve all the problems. In the area of providing or reshaping jobs to offer more challenge and satisfaction (as only one example), the manager will have to draw on all that imagination and experience can furnish. Happily, Bell System managers tend to have a broader range than the age of specialization promotes. We don't have too many like comic Ed Wynn's artist who painted only boats and who, when pressed to do the patron's favorite horse, said, "Okay, but it's going to look like a boat." And it may still be that certain problems will not yield immediate solutions. But the effort itself is a significant message. It spells out that continuing kind of concern, one for the other, that has marked this business at its best.

If then, the sense of proprietorship is really the hinge on which it all turns, it appears we are turning sunward.

A nice time of year, March/April.

SAINT LOUIS MO.

BULK RATE
U.S. POSTAGE
PAID
PERMIT 462

KANSAS CITY PUB LIBRARY 001
PERIODICAL DEPARTMENT
KANSAS CITY MO 64106

AT&T

American Telephone and Telegraph Company
195 Broadway, New York, N.Y. 10007

Moving? Please inform the *BTM* circulation coordinator in your Bell Company's Public Relations Department. **Please include the mailing label from this issue.**

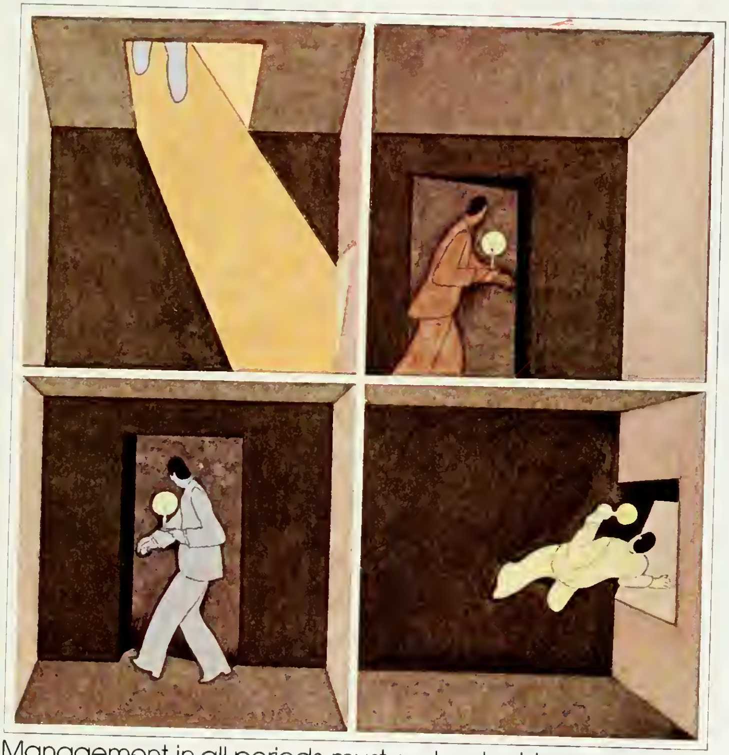
Printed in U.S.A

Printed on recycled paper.

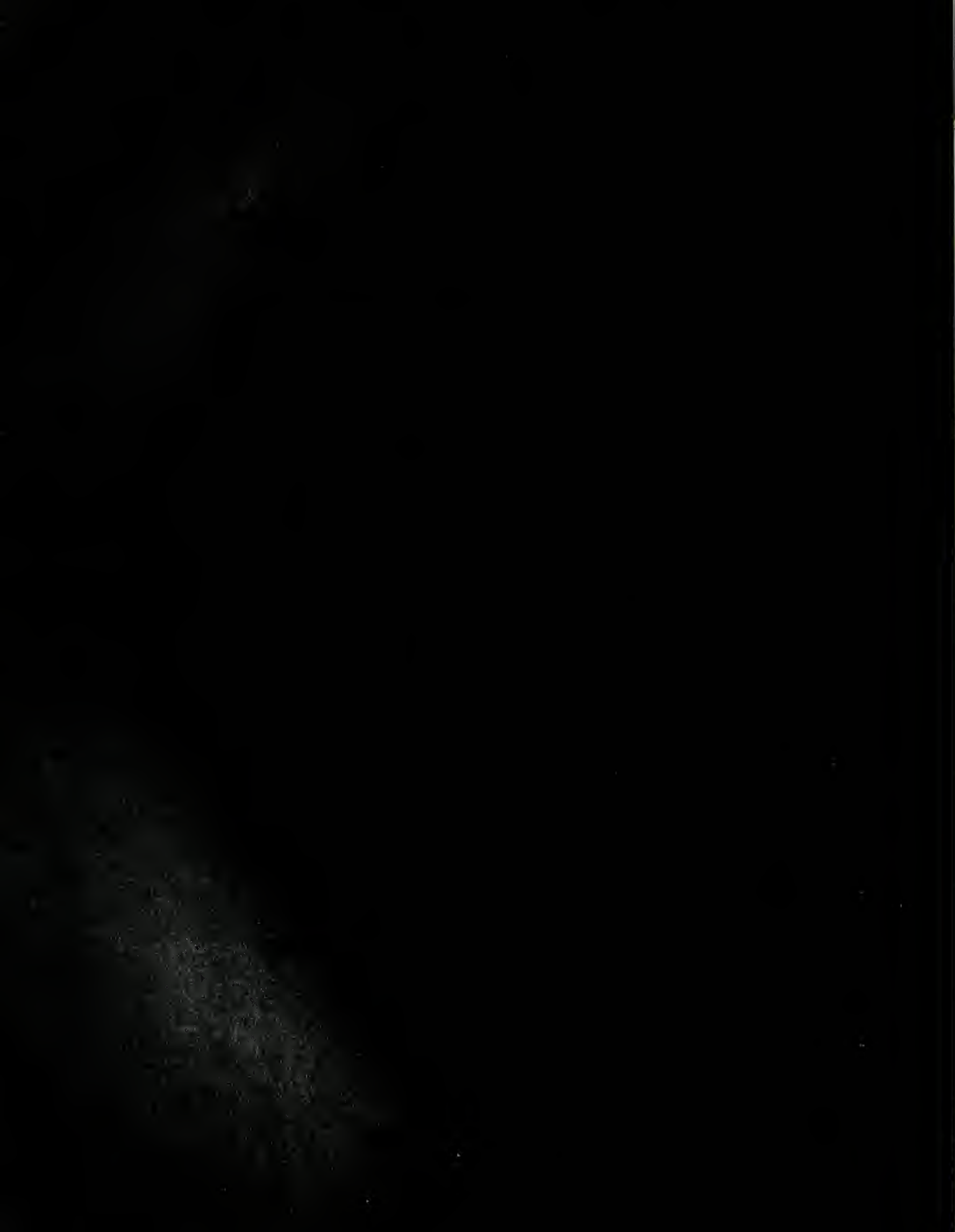
Bell
TELEPHONE MAGAZINE

MAY-JUNE 1973

KANSAS CITY, MO.
PUBLIC LIBRARY
JUN 13 1973



Management in all periods must make decisions, which are choices made under conditions of uncertainty. Page 6



Bell
TELEPHONE MAGAZINE

VOLUME 52 NUMBER 3 MAY-JUNE 1973

2 **Philadelphia Story**
By Dorothea Arnold
The flexibility of ESS lends itself to timely applications and new developments—as seen from the viewpoint of one operating company.

6 **The Crucial Task: Managing in a Changing World**
By Henry M. Boettinger
Where do you turn in a changing environment for the objectives necessary to effective management?

14 **“Thanks, Sweetie”**
By Kim Armstrong
Some avoidable pitfalls in business relationships between male and female managers.

16 **Let’s Talk about Job Enrichment**
By William P. Kuhs
A report on System-wide efforts to restructure work into more satisfying jobs.

24 **A Fresh Look at Costs . . .**
By M. G. Killoch
A cost engineer discusses some of the variables present in the service equation.

28 **A Report on Bell System Architecture**
What’s happening in System building design, and why.

John D. deButts
Chairman of the Board
Robert D. Lilley
President
William L. Lindholm
Vice Chairman
Frank A. Hutson, Jr.
Secretary
John J. Scanlon
Treasurer

Leonard Moran
Editor
Al Catalano
Art Director
Donald R. Woodford
Managing Editor
Edward J. Swartz
Associate Editor
William P. Kuhs
Associate Editor

Published by
American Telephone
and Telegraph Company
195 Broadway,
New York, N.Y. 10007
212 393-8255

A report on some impressive accomplishments in ESS, examples of achievement by "innovation through cooperation."

Philadelphia Story

by Dorothea E. Arnold

As guest editor in the October '72 issue of *Bell Laboratories Record*, Bell Labs Switching Consultant Amos Joel, Jr., said: ". . . developing electronic switching systems was only the first step. Innovation of the highest caliber has been required of Western Electric and the Bell System operating companies. They have had to assimilate the changes necessary to take advantage of the new degree of flexibility these systems afford and then to integrate the systems into the Bell System nationwide network."

The accomplishments of Bell of Pennsylvania's Philadelphia Area reflect a case in point.

–Philadelphia leads all operating areas of the Bell System in commitment to ESS, with 16 electronic units in service and two more to be added this year.

–It has an unbroken record of ESS cutover successes, coupled with an impressive history of machine reliability.

–Increasingly abbreviated installation intervals testify to teamwork and ingenuity in finding new ways to do a better job.

–Innovations, grounded in technical know-how, have met local service needs and contributed to the System's ESS design and development effort.

Much of what Philadelphia has been able to do can be traced to Bell of Pennsylvania's early commitment to electronic technology. Three years before the first commercial electronic exchange went into operation at Succasunna, New Jersey, in May 1965, management had already decided to move ahead aggressively on ESS.

Various factors influenced what was considered by many to be a bold decision. Despite the very brief service history of the new technology, Pennsylvania viewed it as the switching system to meet the needs of the future. Counterbalancing its "getting started" cost was fantastic potential–for better service, maintenance economies and, perhaps most important, the chance to expand in metropolitan areas where growth was fast becoming either physically impossible or financially prohibitive. Thus, Philadelphia began installing ESS units as rapidly as capital, space and equipment availability would permit.

Since the mid-1960s, Philadelphia's progress has centered around a nucleus of very knowledgeable ESS specialists, many of them up-through-the-ranks craftsmen. A prime mover was Jim McPeak, a former No. 5 crossbar switchman who was exposed to the design of ESS while on assignment with Bell

Laboratories. There he helped develop the first four-wire No. 1 ESS for AUTOVON, the military's voice network. In Pennsylvania he shared his knowledge of the language and computer concepts with a handpicked technical team. These were to be Philadelphia's innovators and implementers, applying what they learned on each successive project and cutover.

One of the more important things established by the Philadelphia ESS experience is the potential of the individual. Switchmen, sometimes anxious about the implications of ESS, are reassured as they see others advance as far as their abilities will take them. The company and customers, too, have benefited from the proper match of skill and technical know-how with the demands of the ESS job.

Developing real expertise in a totally new technology, according to Philadelphia people who did it, takes a substantial investment in training, coupled with determination to build on that base with a long-range plan that assures continuity of ESS personnel. Identification of talent is the first step, followed by the training required to develop it. Then it is a matter of creating a management climate where interested, inventive engineers have the freedom and the responsibility for translating ESS possibilities into operating realities. Bell of Pennsylvania engineers are responsible for the total job, from the collection of traffic data to post-cutover visits to an ESS office to see that it is functioning properly.

Team effort pays off

The record testifies to the success of Philadelphia's ESS team. They repeatedly mined new ideas from basic technology. As they moved ahead on many fronts, they not only helped to identify problems, they participated in solving them. For example:

Philadelphia's Germantown ESS office was the Bell System's first application of a No. 1 ESS utilizing the Traffic Service Position (TSP), and also the first application of revertive pulsing. Germantown became a small development center where Bell of Pennsylvania engineers and technicians worked closely with Bell Laboratories' people to zero in on deficiencies of new ESS programs. Solutions developed at Germantown eased later cutovers.

With the installation of the machine in Locust in 1967, Philadelphia again served as a Bell Labs first application site, this time for Centrex as a new service offering of ESS. The city's business community has since endorsed the success of the effort by making Centrex a best seller: Centrex station gain climbed 82 per cent since 1968 with 50,000 stations served by ESS.

Philadelphia was the first to use ESS machine capability to process incoming multi-frequency pulsing calls from panel dial units without an auxiliary trunk circuit. This feature, which is now a standard part of the No. 1 ESS generic program, eliminated the need for a type of circuit which was costly and troublesome. Resulting savings for Bell of Pennsylvania will be an estimated $480,000 by 1975.

Philadelphia originated the concept for an automatic pre-cutover multiple-to-multiple test program that has resulted in virtually error-free introductions of ESS. A standard program developed by Bell Laboratories now provides a similar service for all Bell companies.

Philadelphia engineering originated an ESS method for coin service surveillance to alleviate the growing vandalism problem. This concept, too, has been forwarded to Bell Laboratories for standardization for System application.

Responding to an expressed service need of large hospitals, Philadelphia engineering ingenuity produced "slumber service," a combination of ESS service features which insulates patients from the annoyance of ringing telephones. The hospital attendant simply throws a control key to divert incoming calls to the console or a recorded announcement.

Philadelphia's push toward maximum utilization of ESS is not limited to service improvement. They're also looking at new approaches to traditional ways of doing the job.

System emphasis in ESS is on centralization of maintenance and administration. Philadelphia recognized that need with the initial installations and was one of the first implementers of the concept of centralized technical assistance centers.

Typically, Philadelphia took the concept of centralization still further by making the assistance center the supply source of spare circuit packs and specialized equipment. The result is a $15- to $20,000 reduction of circuit pack inventory at each local office and a broad base to study the rate of circuit pack failures and stocking procedures.

Construction of the city's first all-ESS building, Eastwick, provided engineers with the opportunity to take still greater advantage of the remote control capability inherent in ESS. They duplicated the ESS unit's maintenance control center (MCC) panel in the centralized assistance center; thus, the system could be monitored, tested and controlled without requiring personnel at Eastwick. A more recent local development makes possible dial-up testing of lines and trunks to any ESS office.

Centralized testing

General Operations Manager Jack Feiler, who has responsibility for Philadelphia central offices, stresses that although ESS maintenance concepts are still evolving, the desirability of remote maintenance becomes increasingly evident: "With electronic machines multiplying so rapidly, it makes more and more sense to concentrate technical experts in one place where they can gain and build on trouble-shooting experience. Dealing with more ESS machines, centralized assistance center personnel have to cope with more problems. They can respond more quickly than local office switchmen who see trouble only occasionally.

"And from a financial point of view, taking advantage of the expense-reducing options of ESS as early as possible must be a big factor in justifying the investment."

Bell Laboratories now has under study a control arrangement for centralized maintenance of electronic switching systems. The Philadelphia Area will participate in a field experiment on one facet of the project which will utilize a minicomputer for monitoring ESS machines. The final version standardized by Bell Labs, Philadelphians feel, will have many improved features. Their interim local design arrangement for Eastwick, however, satisfies an immediate service need, provides experience in centralized maintenance and saves the company money. By the time the System standard is available, they stress, their version will have paid for itself many times.

Free exchange of ideas

Philadelphia Area Vice President and General Manager Claude Sharp contrasts ESS application development underway in local operating companies with the broader work being done by Bell Laboratories and AT&T: "When you are dealing with systems as complex as ESS, no one group or unit of the Bell System could possibly be the reservoir of all application knowledge. Bell Laboratories and AT&T, by necessity, must apportion their development priorities to take care of the broadest spectrum first. Meanwhile, companies such as ours have immediate needs, which may be lower on the System's development list.

"The important thing, in my view, is to maintain a free exchange of ideas. Our people have always worked very closely with '195' and Bell Laboratories. One of the strengths of the Bell System organization is the opportunity for everyone to work together in the design and development effort of new technology. We like to think that some ESS work done in Philadelphia has provided an information base on which others could build."

John D. Johannesen, director of Bell Telephone Laboratories' Electronic Switching Systems Laboratory, cites a Philadelphia innovation that will have saved some $700,000 by 1975 and that has also benefited other Bell companies. "They probably were the first in the System to use the ESS machine's copy mode to circulate the updated program to all of their electronic units. We issue a restart generic program each year. There has always been the problem of logistics—how to get it out to the field fast. Philadelphia's copy idea speeds things up substantially. We would like to see more of that kind of initiative in keeping programs up to date across the System."

Installation of ESS units, like development work in Philadelphia, is a joint venture. Bell of Pennsylvania engineers, traffic, services and plant people work as a team with Western Electric, starting long before an ESS is shipped until it is cut over.

The best measure of the effectiveness of this partnership is Philadelphia's roster of trouble-free cutovers and the constant reduction of installation time. The 154-frame Eastwick ESS was installed in 24 weeks, well under the Bell System's most optimistic projection.

These abbreviated installation periods, according to General Equipment Engineer Jim Cornelius, reflect efficient shortcuts that can be achieved by a technically competent team that pulls together. Once again, innovation is a by-product of cooperation.

One of the things Philadelphia engineers looked at with Western Electric was a way to speed cabling work in the early phases of an installation. Don Parsons, the Western supervisor, felt it would be easier for his installers to work from scaffolding instead of ladders. Bell of Pennsylvania agreed to provide it.

Shaving installation time

Not only did the scaffolding save time, it demonstrated to everyone on the project that the telephone company meant business about reducing intervals. Later, Bell of Pennsylvania provided portable power supplies so that Western could start testing the central processor before regular power was available. This shaved the amount of overall installation time by another four weeks.

Shortening installation intervals equals substantial dollar savings. Bell of Pennsylvania is paying interest during installation on an ESS capital investment of $2- to $5.5 million. The sooner an ESS unit is in service, the more capital the company can conserve and the sooner the customer service advantages of ESS can be realized.

The spirit of mutual assistance between Western Electric and Bell of Pennsylvania people evidenced in Philadelphia pays off in better ESS machines and better service. For instance, Western cooperated in the hands-on training of craftsmen by allowing Bell of Pennsylvania a full tour of testing while installation was still underway. Not only did this slash the turnover to cutover interval (down to two weeks at Eastwick), it provided the opportunity for people charged with maintenance of the machine to work with a Western installation team reputed to be one of the best in the country. Rub-off knowledge and the relationships that grew out of these associations helped when problems developed after cutover.

Cooperation spells success

Philadelphia has been able to refine these cooperative techniques through each successive ESS job. There is nothing magical about it, everyone involved insists, just people recognizing the need to work together to get a job done. "Our relationship is excellent," says Jim Cornelius, "although you would wonder if you heard the good-natured needling at our post-cutover evaluations. On a job, though, nobody tries to put the other fellow down and the NIH (not invented here) factor never gets in our way.

"If I had to sum up, I would say the most important element in Philadelphia's success is attitude—a determination to make each job go better than the previous one, to create progress as opposed to being pushed into it."

Bell of Pennsylvania's President William S. Cashel, Jr., sees a System message in the Philadelphia ESS experience: "I can't say enough about this kind of cooperative, innovative approach. Only by working together, on the frontiers of technology, can we master the technological challenges that change and the increasing needs of customers will impose."

Miss Arnold is the editor of NEWS/LINES, employee magazine of Bell of Pennsylvania and The Diamond State Telephone Company.

The Crucial Task: Managing in a Changing World

by Henry M. Boettinger

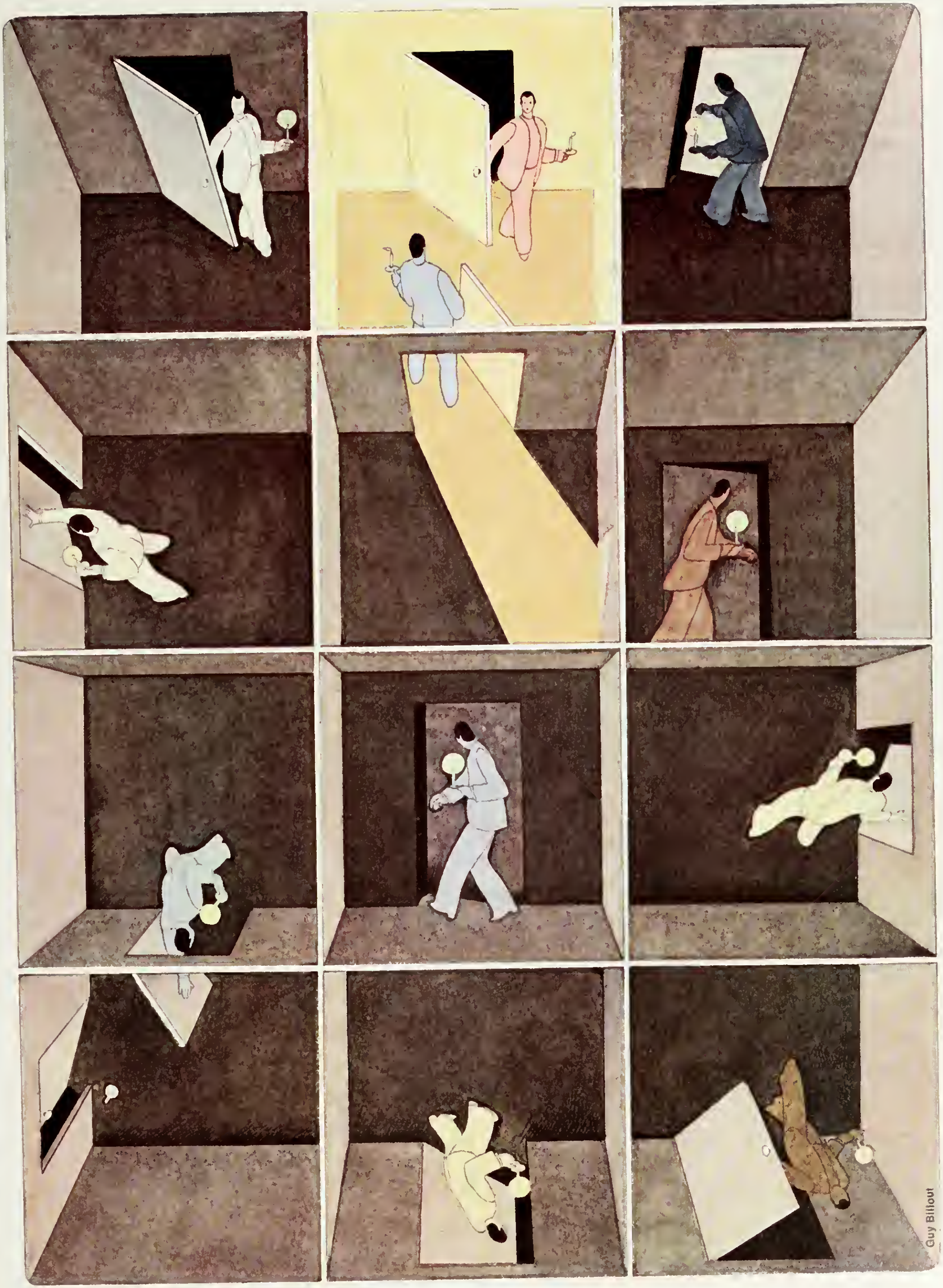
"Nothing fails like success" was the central lesson Dean Inge digested from his ruminations on our civilization's history. Received as a clever paradox, the noted clergyman's shrewd insight finds only too-vivid confirmation in our own time. Nearly every vision that men at the turn of the century battled for has been achieved in the Western world. Democracy based on universal suffrage, compulsory education, the harnessing of science to expanding industries, greatly increased incomes, control of infectious diseases, workmen's protection, social insurance, cheap transportation, communications and power, and widespread material amenities are all accomplished facts.

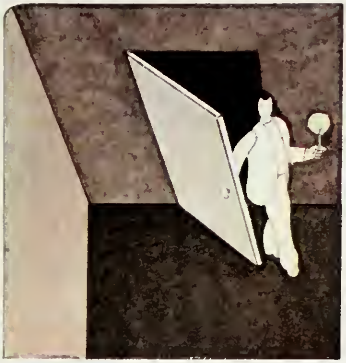
Yet, in spite of this success, every institution of our society is "in trouble." Sundry pundits compare the worst examples of current practice with the best of theoretical ideals, and numberless books, articles and broadcasts entreat those in charge either to change their ways or prepare to face annihilation and breakdown of society as we know it. Few of these apocalyptic works offer men of affairs concrete help in understanding the interactive forces at work, at least from the point of view of those leaders who must actually invent, evaluate, select, and make the changes necessary to bring their institutions into a workable congruence with the society they are designed to serve.

Every human institution, from a family to a nation, develops along three strands. Available energy is channelled and transformed into different actions depending on which of these strands it is conducted. The three strands, or principles of development, are competition, cooperation, and innovation. In America, we tend to think of competition as the antithesis of cooperation, or innovation as always progressive and the inevitable accompaniment of competition. But close observation of any organized effort will show all three present simultaneously, though in varying degrees of strength at different periods or situations. Each principle contributes to increased excellence only when the various sets of activities involved are channelled to the principle most appropriate for it. When a specific activity is guided by the *wrong* principle, chaos, absurdity, decline, or other forms of disorganization develop. Also, experienced practical men, as well as historians, know that not every innovation lives up to its initial promises.

Consider a rowing race, where each boat contains eight oarsmen and a coxswain. Each crew is in absolute competition with other crews, yet each member of a single crew must cooperate in iron conformity to the beat set by the cox, and their improvement over previous performance is due to innovations in training, technique, or equipment. Team sports of every type employ simultaneous operation of the three principles, and such idealized forms of human effort make them beloved by leaders struggling to communicate grand visions to their organizations. The theme, baldly put, is "We must all cooperate and innovate so that we can compete." But notice how these words take important assumptions for granted. Suppose all of the competition energy is *internal* to the organization (office or campus politics) and cooperation means satisfaction with a "share of market" or "share of resources" status quo. Innovation will then be diverted to serve perverse ends—primarily individual or departmental advancement. It is as though our crew members bent all their efforts to supplant their leader on the stroke oar, regardless of how their boat did against other crews. History is littered with examples of such human tragedy. Heads of governments, university deans, factory foremen, and even bishops are not innocent of such experiences.

On a somewhat higher plane, but still pertinent, management consultant Peter Drucker notes that the United States is the only nation in the world where government and business are seen as adversaries. This may be the logical consequence of our faith and doctrine in the Constitution's separation of powers, but when old markets take on global dimensions of supply and demand, such postures may not be the best-tailored for the nation's modern interests. Conversely, in institutions where cooperation and maintenance of equilibrium were the traditional desiderata, allowing the role of ri-


Guy Billout



Our favorite adjective is 'reasonable.' Few of us are comfortable with a highly refined ideology, where pre-programmed answers to every problem are processed on demand. That has not been our way.

valry to be increased may be the proper prescription for new expeditions toward excellence.

Thus the great pendulum swings —in education of the young, in agriculture, churches, military affairs, government, philanthropy, and business—in ways far more complex than easily-understood sports and games, and each age begins the debate anew. Excesses of cooperation sound the call for competition, and excesses of competition raise the cry for cooperation—both insisting, often rightly, that their advocated reforms will spur needed and possible innovations. In a society as variegated as the United States, we are not surprised to hear the shouts of recruiters to both standards simultaneously—ecologists for more cooperation, consumer advocates for more competition are only two current examples.

We call our society a "pluralistic" one—which means we are content to enunciate and strive for contradictory goals without embarrassment, because we know that compromise between extreme views is the practical way our development has occurred. Our favorite adjective is "reasonable." Few of us are comfortable with a highly refined ideology, where pre-programmed answers to every problem are processed on demand. That has not been our way. Instead, we prefer a certain looseness in our systems, but not *too* much for discomfort or collapse. Knowing where the boundary lies makes a person a candidate for the pinnacle of wisdom.

Assaulting infinity

The argument over liberty and equality rages at the same intensity as it has for two hundred years, and we are not daunted by the historical fact that large-minded and decent-hearted men, like John Stuart Mill, carried their struggle to reconcile the two goals to their graves. We still want *both*, and perhaps the best course is to keep on trying, even if logic tells us we are assaulting infinity with bare fists. We must search for that "harmony in opposites," so irritating to the Western mind.

To manage any institution in periods of intensified change, a leader should be aware that these great surging currents of human aspirations will still toss his ship about. In taking initial steps toward rectifying the deplorable effects of past social discrimination, a pioneer will be accused of tokenism. If this causes him to hesitate, he will meet the charge of chauvinism. Leadership is not a game for ideologues—at least not today.

In making the adaptations necessary, leaders will have to examine which profile of the three principles of competition, cooperation, and innovation is best for a particular situation, internal or external to their institutions. Multiplication of the constituencies of every manager will make this choice more difficult than it was in the past, and explanations of why a particular choice is made will have to face new, larger, and more critical audiences.

Can an institution learn?

The two essential requirements for a successful man-of-affairs still remain: (1) he must be *positive* about what he wants to do, and (2) he must be able to explain what he wants to do to both potential allies and hostile critics. Those tests of leadership will be with us for a long, long time.

We do not "know-it-all;" and know we never can. The race between incessant demands to act and our enclaves of ignorance calls for that condition of mingled curiosity and faith in the power of knowledge which we call "learning." It is hard enough for an individual, but when institutions themselves are told they must learn, we are carried beyond the frontiers of optimism and common sense. Institutions are created by humans, and when we use the metaphor of "education of an institution" we mean that the individuals who give allegiance to it undergo a transformation under the guidance of enlightened leaders. Revolutionists, of course, believe this to be absurd or impossible, and seek ways to supplant existing leaders in order to seize their chambers of policy and instruments of discipline. Even the most cursory reading of history shows that revolutions are successful only when existing leaders demonstrate beyond doubt that they have exhausted their capacity to learn—in short, they could not develop new abilities to handle new types of problems.

Consider some conclusions drawn from a number of nationwide studies conducted by Daniel Yankelovich in the recent past. *More than half* our population now believe the following three statements, which represent a startling shift in attitudes of great significance to those in leadership positions throughout our country.

- You cannot trust statements made by leaders in our society.
- You no longer get what you pay for. (Unreliability, poor quality, service deterioration, deficient corrections.)
- Environmental problems could be solved if those in charge really wanted to solve them.

Another survey of college students disclosed that a majority believe: "Hard work no longer pays off."

Were this array of beliefs to grow and be sustained, they would dissolve the social glue that has held our society together. What can one do to disprove or dispel these feelings? It can only be done by demonstrated performance over a considerable span of time, not by public relations tricks, which will be counter-productive. Seldom in the past have leaders been faced with more obdurate and complex obstacles to progress. But they also have available the unparalleled resources of an educated population, relevant technology and science, superb methods of information and communication, and an economic base of proven capacity.

Heresy as a motive force

What else is required? The answer is both simple and complicated: New ways of combining these resources so that they become mutually supportive, rather than mutually disruptive as they now so often seem to be. Such new approaches will be found—if at all—by acquiring new perceptions of reality. Flight to the fantasies of nostalgia, of a "world that never was," or wishful thought without commitment will not do. Hard-headed men who have made their perilous ascents to leadership naturally possess unbounded faith in those structures and systems to which they owe their success. How difficult it must be for them to entertain heresies! But the undulant curve of human progress shows that the great ones can and do so—in fact, are remembered *because* they did. When operating in the "learning society," managers must be on guard against an overdeveloped sense of skepticism. As healthy as it is in stable times, when novel circumstances surface, it needs to be held in check —at least for a decent interval of hearing. To offset this bias, statisticians distinguish two major classes of error in framing hypotheses:

- Assuming *true* that which is *false*.
- Assuming *false* that which is *true*.

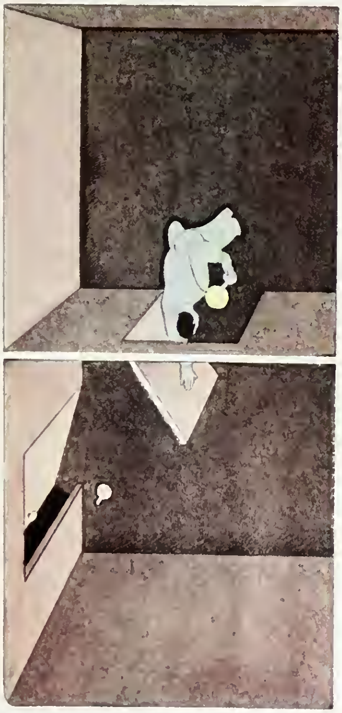
The habits of a lifetime seldom allow a leader to make the first class of error, but can make him excessively vulnerable to those of the second. If one refuses to act on information or intelligence until it is absolutely proven beyond doubt, he will find himself constantly behind others in both tactical response and strategic innovation. The exasperating behavior of lower functionaries and officials here finds its roots: the paralyzing fear of being wrong. It is exactly the inverse behavior of the entrepreneur, whose driving force is the hope of profit by assumption of risk. Even law courts insist that only proof beyond a *reasonable* doubt be required for decisions.

Management in all periods must make decisions, which are choices made under conditions of uncertainty. But the uncertainty in our current situation has been magnified to such an extent that author and scientist C. P. Snow reports a general malaise throughout the world, expressed as, "We know so much, but feel we can do so little." Our information technology promises to let us know even more, but until these new floods of information are patterned by a human intelligence and coupled to courage, they contribute only additional loads for already burdened leaders.

Donald Schon, in *Beyond the Stable State*, states that every institution can be characterized by three

Hard-headed men who have made their perilous ascents to leadership naturally possess unbounded faith in those structures and systems to which they owe their success. How difficult it must be for them to entertain heresies!

Without profits a business fails, but merely having them does not make it a success in the eyes of increasingly powerful constituencies. Long-term results, achieved in support of—at least without harm to—other objectives of society, are a far sterner test and one which dominates the minds of business leaders.



aspects: its *"theory,"* doctrine, or "philosophy"; its *structure*, or relationships among its members; and its *technology*, or the processes, tools, and materials it uses. In the past, managers have felt they could treat each of these as separate functions without undue harm, but under today's conditions the three aspects all *interact* with one another. Simply put, a change in one puts stress on the other two, these stresses cause change with reactive effects on the others, and so on, in a continuous adaptation.

If Schon is right, the interventions managers make in altering their organizations must take account of all three dimensions simultaneously. A routinely assigned division of labor, with severely partitioned tasks—which works so well in a factory—will produce disappointment.

Many of our present troubles can thus be seen to have their origins in great successes in one dimension whose propagated stresses were not matched or allowed for in the others. Whether in the international monetary system, urban renewal, new technologies in industry, new sources of pupils and teachers in education, taxation, military supply, welfare, medicine, transportation—on through the whole agenda of difficulty—rapid alterations in one dimension have not been matched by adaptations in others. "Seeing" an institution in this way, of course, is called "systems thinking," where one tries to improve the *overall* operation, not merely one part of it. But what do we mean when we say "*improve*" it?

This brings us to a central antecedent problem of managing in a changing world: *the selection of criteria of effectiveness*, and securing acceptance of them by those constituencies who can assert a legitimate interest. Without clear criteria, the entire process of management becomes absurd, because a manager cannot rationally develop those objectives and goals necessary to lead large numbers of individuals engaged in a common effort. A manager without them must stand mute when asked: "Just what are you trying to do?"—or at least be unresponsive. The stereotyped capitalist dismisses this with a mocking smile, "After all the bunk is cleared away, it's only earnings-per-share that count." Admittedly, such ice-pick concentration can often produce apparent miracles of short-term results, sometimes achieved by robbing past investments and mortgaging the future. But such a manager purchases his single-mindedness by confusing ends and means. Profits are one means by which a society's larger purpose is served. They are one test of effectiveness—a harsh one, indeed—but they are a constraint, not an *end in themselves* from society's point of view. Profits are the igniters needed to fire the engines of private enterprise. They are both the test of past decisions and the spur to assume new risks. Also, research, development and innovation depend on current profits for their support and furnish the strategic "cultural reserve" for future adaptation to changed demands and opportunities. Without profits a business fails, but merely having them does not make it a success in the eyes of increasingly powerful constituencies. Long-term results, achieved in support of—at least without harm to—other objectives of society, are a far sterner test and one which now dominates the minds of business leaders. Yet the existence of fairly clear criteria of performance has accounted for a great deal of the vigor, responsiveness and drive one finds in business management. The large question ahead is how to maintain that vigor with an expanded set of criteria, of far less precision than profits. These hopefully are to be precipitated from the cloud of presently raging controversies over the dimensions of "public interest"—a murky phrase which seems to mean something different to everyone.

A profit criterion is incomplete

Also, business leaders have found it extremely difficult—if not impossible—to have all of the persons throughout their organizations embrace corporate profits as a criterion of their individual effectiveness. Profit centers, decentralization, statistical surrogates of operational quality and efficiency, and other forms of incentives have proved very useful, but still cannot do the entire job. People now want

—and need—to feel their time and contributions have been put to worthwhile use, and seek daily reinforcement that their presence makes a difference. Employees petition not only "Treat me well," but also "Use me well, and trust me." It is here that new performance criteria may find their most fertile ground.

It seems clear that a manager of any organization will not be able to function well if every decision he makes is subject to second-guessing and new performance criteria brought up *after the fact* by his constituencies, superiors and people in his charge. That is a fool's game, but many are forced to play it today. It produces a disorientation remarkably similar to the effects of scientific "brainwashing," where a succession of unpredictable stimuli, of unpredictable intensity, finally disables the ability to perceive and act by destroying those purposeful cause and effect relations which a normal mind seeks and needs to remain rational.

Consider the constituencies which a president of a great university must somehow find ways to satisfy today: undergraduates, graduate students, minority groups, young untenured faculty, tenured faculty, his administrative people, alumni, foundations, state legislators, city councils, federal grant officers, community groups and leaders, and his governor and mayor. Is there *any* set of practical goals, much less methods, which he can find to bring their legitimate concerns to some focus which can energize their contributions toward achieving those goals? If not, how can any suggestions or innovations be judged? How can his performance be judged by each of these constituencies? The president presides over an institution at the center of a learning society, and his problems of management are similar to those faced by every other leader today. Only their constituencies differ.

If after-the-fact appraisal is unworkable, what alternatives are left? A scholar might flee in desperation to Machiavelli, and try to play off each faction against another, but this requires a nimbleness and lack of principle, as well as ultimate powers of enforcement and discipline not usual to leaders in our society. A leader who believes he enjoys charismatic gifts might emulate Luther, and nail his personally revealed goals to the college door with this implication: "All who agree, get in; all who don't, get out." It is a course of great manly appeal, but he must be sure the best remain. This sort of behavior today is more likely to produce the reverse effect. Pascal's insight hints why:

"People are generally better persuaded by the reasons they have themselves discovered than by those which have come into the mind of others."

One remaining alternative to a state of random after-the-fact criticism lies in the use of the *planning process*, where agreement on *what is to be done* and *how its effects will be judged* is the overriding purpose. It is not safe to begin the arduous tasks of implementation of any program without establishing these twin beacons of decision. As a purposeful program cuts its way through the tangle of events and errors, continual reference to their constant beams allows all involved to fix their positions with an accuracy which now eludes us.

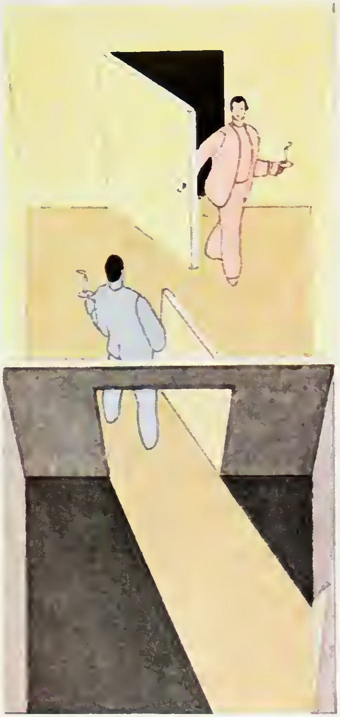
The most demanding task

Planning is thinking ahead with a view toward present action, and when done seriously, is management's most demanding task. It is unfortunate that planning has become an antonym for democratic processes, but we should not deny ourselves its use because of a tyranny of obsolete controversy. Our present methods of "planning by existing momentum" are taking us to unwanted destinations. At stake may be the survival and enhancement of real democracy, where the views of many voices are listened to with respect before a course of action is embraced. But an appropriate planning process must traverse a path atop the two slippery slopes of demagoguery and "consensus" management. The one panders to base instincts and grievances, the other settles for the least-common-denominator of agreement, drowning progress in lethargy.

A planning process geared to

Our present methods of 'planning by existing momentum' are taking us to unwanted destinations. At stake may be the survival and enhancement of real democracy...

To be intelligent means to be able to perceive and adapt to changing conditions. It is the primeval condition for survival.



modern managerial needs will have two attributes: (1) It will not underestimate the intelligence of its participants, and (2) It will not overestimate their information. Much of the barren controversy we observe today flows from attitudes the reverse of these.

To be intelligent means to be able to perceive and adapt to changing conditions. It is the primeval condition of survival. Special knowledge, techniques, and information have much to contribute, but without the nexus of a planning process on which to home they are now consigned to arid journals, where barriers of language and readership make them ciphers in decision. Drucker contends that making proper use of the "knowledge worker" is one of the unsolved riddles of our age. We can do better, but old antagonisms first must wither, and the joy of battle with long-standing adversaries must be forsworn. A temporary guide during our passage toward the Post-Industrial Society might well be that of experienced diplomats: "Treat every enemy as though he may become your friend, and every friend as though he may become your enemy." The price of luxuries like permanent allies and antagonists will soon be beyond our means.

First *what*, then *how*

Experienced men, rich in disappointments, and poor in triumphs, will rightly turn skeptical eyes toward a planning process patterned after once-fashionable Planning-Programming-Budgeting Systems. These philosopher's stones promised to solve all problems of previously intractable areas at one stroke. Their seeds of failure lay in an inability—or their elitist practitioners' unwillingness – to give appropriate weight to non-quantifiable, but vital, factors in programs designed to deal with human aspirations and human nature. Of course they could not deliver, except in those limited affairs where only technological considerations prevailed. Required, instead, are methods by which the neglected, but essential, *antecedent* steps of deciding *what* is to be done, before one turns to *how*, and securing wide consent as to the purpose of a proposal for improvement. Impatient men may be attracted to methods of *compelling* agreement, but history gives it low marks for success.

Since de Tocqueville, foreign observers have remarked on a reflex in Americans to remedy any and all ills with rapid, specific legislation. "There ought to be a law!" is the citizen's initial outburst in situations where his interests are harmed or frustrated. The edifice of our Law is a marvelous collective accomplishment, a monument to generations of its thinkers and practitioners, a shield for rights dearly purchased. But the Law's roots are found in *sanctions*, and make it too rough an instrument for the cultivation of the kind of progressive planning processes and managerial systems we need today. As Holmes said, "If you want to know the law, and nothing else, you must look at it as a bad man," but we now need forms and guides which can mobilize the creative energies of *good* men. We can no longer take those energies for granted and see the task of progress as one of constraining them. B. H. Liddell-Hart analyzed what he called "the fallacy of compulsion" in the following lines:

"We learn from history that the compulsory principle always breaks down in practice. It is practicable to *prevent* men doing something; moreover that principle of restraint, or regulation, is essentially justifiable in so far as its application is needed to check interference with others' freedom. But it is not, in reality, possible to *make* men do something without risking more than is gained from the compelled effort. The method may appear practicable, because it often works when applied to those who are merely hesitant. When applied to those who are definitely unwilling it fails, however, because it generates friction and fosters subtle forms of evasion that spoil the effect which is sought. The test of whether a principle works is to be found in the product.

"Efficiency springs from enthusiasm – because this alone can develop a dynamic impulse. Enthusiasm is incompatible with compulsion—because it is essentially spontaneous. Compulsion is thus bound to deaden enthusiasm—because it dries up the source. The more an individual, or a nation, has been accustomed to freedom, the more deadening will be the effect of a change to compulsion."

The harsh realism of this passage gives clues as to why hopes of social progress based solely on legislative acts are so often disappointed in their implementation. Managers of our institutions should not expect to find the primary solution to their problems primarily on the legal path. Much can be done in rearrangements of existing legal relationships, as some have proposed for the tangle of eighty-thousand local and state governments—and the task is awesome. But these rearrangements and rationalizations can at most only set up conditions for enthusiasm and new ideas to flourish, not guarantee them.

"Duty"—a repressive force

Until the recent past, legislative issues and their attendant factional slogans would have dominated any discussion of programs for progress. Is this due to a collective disenchantment with a once-bright weapon that now so often breaks in the hands of those who try to use it in good causes? Or does it reflect a subtle, growing realization that it is far harder to *make* persons do the right thing than to *prevent* them from doing wrong to others? Older societies tried to furnish positive motivation by inculcating the concept of *duty* in their members. But this was only successful in penetrating the layers of those trained for—and usually born in—existing governing elites. In retrospect, we can see that it led to excessive conservatism, as the baton of "duty" was passed unchanged from generation to generation, continually raising the pressure for political and social upheavals. Our nation was born in one of them.

We must find another principle for our particular conditions and their future configurations. This may be the most important strategic problem confronting managers in the next decade or two: Discovery of new arrangements, organizational forms, relationships and processes which can persuade persons throughout our institutions to volunteer their minds and energies to purposes both they and society consider worthwhile. Drucker once defined the task of management as: "to organize the work, and organize people to do the work." In our mid-passage to the Post-Industrial society, the last phrase may have to be revised as: ". . . and find ways to get people to do the work."

A landmark in the history of ideas was that of Vico (1668-1744) who said for the first time: "The social world is the work of men." Today, we find the statement banal, but in an age when all events and relationships among mankind were ascribed to Divine Will, it was a notion correctly seen as heretical and dangerous. If society were man-made, then other men could re-make it. Here lies the foundation for both the ideas of human progress and of revolution. All later concepts of management flow from this view. If one embraces it, the effects can be enobling or terrifying. When blame for existing conditions cannot be placed elsewhere, man himself must assume responsibility for changing them. Responsibility is the great developer of people, and managers *are* managers because they carry burdens of responsibility. *How* they carry them dictates their own development and that of our society; what they *believe* dictates how they decide to carry them.

If managers of our institutions believe that responsibility is limited to keeping their organizations merely afloat on currents of change, they are commanders of rafts, indifferent to the fate or problems of other managers or institutions, and we should abandon hopes for progress. If managers believe that their responsibility requires concern with how their organizations affect—and are affected by—the development of others, we stand a chance.

If society were man-made, then other men could re-make it. Here lies the foundation for both the ideas of human progress and revolution. All later concepts of management flow from this view.

Excerpted from a chapter by Mr. Boettinger which appears in the forthcoming book, Challenge to Leadership: Managing in a Changing World *(Copyright 1973 by The Conference Board), by permission of The Free Press, a division of Macmillan Publishing, Inc., N.Y. Mr. Boettinger is AT&T's Director of Corporate Planning, and is a Fellow of the International Academy of Management.*

A man at AT& asked me to write th he ended the conversation by saying: “Thanks

by Kim Armstrong

That seems like a good place to begin a piece on potential pitfalls when men deal with women in business. Don't call them sweetie. Or dear. Or doll. Unless, of course, that's what you call your male associates as well.

The lesson is not a frivolous one. It is being faced more and more often by men who find themselves dealing with an increasing number of women in positions of authority in the business world. Nor is it confined exclusively to men. Veteran businesswomen, long used to working mostly with men, sometimes make similar slips.

Calling a businesswoman sweetie isn't apt to merit a man a chauvinist of the year award, but some slips can cause serious embarrassment. Consider the plight of a Midwestern telephone executive who arranged a luncheon for visiting managers in one of his city's finest clubs. They arrived for the meal, only to be advised in no-nonsense tones that the woman in their group was *persona non grata*. Women aren't allowed, ever, attendants said. A hasty conference turned up the name of a nearby restaurant that would welcome her, which was all that could be done to make the best of a bad situation.

That slip was immediately obvious to the man who made it, and was an embarrassment for everyone involved. Others are less likely to cause such a commotion, and often don't come to the attention of those who make them. An AT&T woman gives an example of such an oversight:

“Our offices have a stencil giving the name of the occupant, let's say *Mr. Smith*. It's custom, when the occupant leaves for another job, to remove *Smith* and leave *Mr.* there. Now this may be a small thing, but there's a hidden implication. I'd just like to think someone believed there was a reasonable possibility that the next occupant might be a *Ms*.”

The issue isn't grabbing headlines, like the broader and more important problems of equal opportunity, equal pay, or equal recognition under the law, but it is significant to women who are striving to work and be treated as equals in business situations.

“It's not as petty as it may seem,” says a Southern Bell woman. “What's involved is day-to-day operational mechanics that can make for smoothness or for lack of it.”

On the other hand, it's not surprising when men find the situation confusing. Such a question as whether or not to light a businesswoman's cigarette caused one aware but unsure AT&T man to think out a plan. When a woman takes a cigarette he slowly—but slowly—reaches for his lighter. If she reaches for the matches, he leaves his lighter where it is; if she pauses, he quickly produces a flame.

“The courtesies—we thought of them as courtesies—men and women followed for ages are changing,” he says, “and I'm just not sure where we stand now.”

While there isn't a definitive source, an informal survey of Bell System women shows that they are in close agreement on where *they* stand. Until an Emily Post of the new generation of businesswomen comes along, the pitfalls they cite as being most common may serve as a guide to well-motivated businessmen.

Don't make assumptions. This is an important category, and one that can not only spare you personal embarrassment, but avoid embarrassment for the company you represent as well.

Don't assume women have limitations that men don't have. It isn't necessarily true, for example, that she can't travel or accept an assignment in another city because she is married or has children. You won't know until you ask her. “Equal employment,” says a Missouri telephone woman, “includes equal opportunity to accept or refuse assignments.”

If she does travel, don't make other assumptions. An Ohio Bell woman who accepted a staff loan assignment to another company was startled when a male associate offered condolences. “He assumed that my marriage was in trouble or I wouldn't have agreed to be away from home,” she recalls. “No one would make that kind of an assumption about a man.”

Don't assume all women in business are in traditional jobs. An example is cited by a Pacific Telephone woman who normally calls for her own airline tickets. Her company's reservations clerk always takes the information and asks, “And what's your boss's name, dear?”

Don't assume a woman's presence means she is in a services role. A New Yorker tells about the time she was the only woman—more usual than unusual—at a business social occasion. A man rushed up to her, saying, “You're just the girl I want to see,” and proceeded to give her his drink order.

Speaking of girls, don't. Avoid calling your secretary “my girl,” either in speaking about her or in memos. It is offensive to many women, and implies a demeaning ownership. Women in business, as a general rule, don't like to be called girls under any circumstances.

Nor do they like it when all references to company employees,

(Not the editor.–Ed.) article. I agreed, and

Sweetie.”

written or spoken, are to men. A Long Lines woman recalls a company workshop in which management employees were being given objective methods by which to assess job performances. “The references in the material were all to ‘the man’ being appraised,” she says. “*Person* would have been such an easy word to substitute. If your references are to men, you don’t include women. And that puts the company in an awkward spot.”

Do be natural in dealing with a woman. She thinks of herself as your associate, not as someone who needs special treatment. If you’re in front of several women in a crowded elevator, go ahead and get off first. It’s easier and more natural. The same guideline goes for lighting cigarettes, opening doors, walking on the outside of a sidewalk, shaking hands, or deciding who drives the company car.

Most women are particularly emphatic on the point of naturalness when it comes to off-color stories or swear words.

“I’m usually the only woman at a meeting,” explains an AT&T woman. “And every time a four-letter word comes out, even an innocent damn, the whole room turns frigid with embarrassment and the speaker makes profuse apologies. The language doesn’t matter so much to me. What does matter is that I’m made to feel out of place.”

When you do perform a courtesy for a woman, such as helping her with her coat, don’t accompany the gesture with comments like “hope you aren’t a women’s libber.” Chances are she believes in equal rights for women, but won’t appreciate the implication of being labeled. If you want to be sure, don’t bring up the topic of women’s liberation in business dealings at all.

When you mean to compliment a woman, be sure she’ll take it as one. Don’t be surprised, for example, if she takes offense when you give her your highest compliment: “You really think like a man.” A Long Lines headquarters woman vouches that this really happens: “During my annual appraisal session, my boss lauded me for the ‘masculine qualities’ I brought to my job—mainly being aggressive and not afraid to speak my mind. He really said that. What’s worse, he thought it was a compliment. I’m a woman trying to do a good job. Since when is that a masculine quality.”

And don’t be misled into thinking you’re making her feel welcome, when she’s the only woman at the meeting, by saying she has “brightened up the place.”

“I don’t attend meetings or conferences to improve the decor,” says a Bell Labs woman.

When you’re meeting with a group that includes a woman, don’t automatically assign her the role of taking notes. Lots of businesswomen didn’t learn shorthand—on purpose. And don’t look to her for the “woman’s viewpoint.” She’s a businessperson, same as you, and doesn’t speak for all women.

As implied earlier when you’re setting up a luncheon or dinner that includes women, steer away from private clubs that exclude women or provide separate entrances for women. If you are not completely sure about the arrangements, ask.

On the other hand, don’t carry your awareness to extremes. An AT&T woman tells about being in a group of businesspeople who spent the morning meeting with a telephone company coordinate in a Southwestern city. At noon, he announced lunch had been arranged and led the way. When he directed the group into a major department store, they thought he wanted to pick up a tie. But he led them up to the store’s fourth floor tearoom, turned to her and said, “I thought you would be more comfortable here. They’re having a fashion show today.” She said nothing, but suffered indigestion.

And if you’re lunching with a businesswoman, don’t battle for the bill when it is natural for her to pay. There’s no reason for you to be uncomfortable. “It isn’t a date,” says an AT&T woman. “My company expects me to pick up the tab in an appropriate situation.”

If you’re not sure whether a correspondent is male or female, don’t assume the odds favor a male and reply to “Mr.” Use the full name in the salutation. And if you’re not sure whether she is Miss or Mrs., you’ll find that, unless they have indicated otherwise, Ms. is perfectly acceptable to most businesswomen. *Ms.*, by the way, isn’t a joke. Many women prefer it. And even if the word’s pronunciation – miz – may still sound strange to your ears, an issue shouldn’t be made of it. Generally, if you’re not using Mr. in front of men’s names, you’re better off not using anything in front of women’s names.

Although they’ve all run into businessmen who deeply oppose women in business, few Bell System women believe these common slips are generally intended to make them feel uncomfortable or unwelcome in the business world. Mostly, they say, it’s just a lack of awareness.

Perhaps that would be a good place to begin a piece on potential pitfalls when men deal with women in business: Be aware.

That’s always good advice when people deal with people.

Among her responsibilities as publications supervisor at Long Lines headquarters in New York, Ms. Armstrong edits Long Lines *magazine.*

"What is happening, is that the work ethic is undergoing a radical transformation. Workers, particularly younger ones, are taking work more seriously, not less. Many may have abandoned the success ethic of their elders, but they still believe in work."

TIME MAGAZINE

"The discontent of trapped, dehumanized workers is creating low productivity, increasing absenteeism, high worker turnover rates, wildcat strikes, industrial sabotage, poor quality products and a reluctance by workers to give themselves to their tasks.

"Work-related problems are contributing to a decline in physical and mental health, decreased family stability and community cohesiveness, and less 'balanced' political attitudes.

"Growing unhappiness with work is also producing increased drug abuse, alcohol addiction, aggression and delinquency in the work place and in the society at large."

HEALTH EDUCATION & WELFARE STUDY TITLED, "WORK IN AMERICA"

"Somewhere on the way to building an industrial system that prides itself for efficiency, something has gone wrong. Technology has made huge advances, but it has brought no solution to the problem that manifests itself in new gadgets that won't work and the general deterioration of services—a surly repairman, an inattentive clerk, a bored secretary.

"While government and business leaders exhort workers to increase productivity, symptoms of alienation continue: low production, poor quality products, high

Let's Talk About Job Enrichment

It was formerly known as the Work Itself program. A more apt description now is Job Restructuring. But its aim is enrichment, and Bell System managers in every part of the country see in it an idea whose time has come, an answer to the employee's plea to 'use me well.'

Over the past few months—as any reasonably alert reader or viewer will no doubt agree—the press, national magazines and network television all seem to have simultaneously re-discovered that the younger, better educated worker of today is rejecting some of the traditional attitudes toward work that were held by his father and grandfather.

No longer content to suffer in silence for the sake of the almighty paycheck, when chafed by the "tight white collar" or depressed with the "blue collar blues," these youngsters are saying "No, thanks," to unsatisfying, unchallenging, uncreative work. Fortunately, in addition to noting the symptoms of this discontent, the press has taken to spotlighting the various measures undertaken by industry in its attempts to solve the problem.

It should be highly flattering to us that the Bell System is consistently singled out as a company that very early recognized this trend and began doing something about it. One of the principal reasons for our pioneering efforts, it should be noted, was that the telephone industry was among the first to feel the trend's effects.

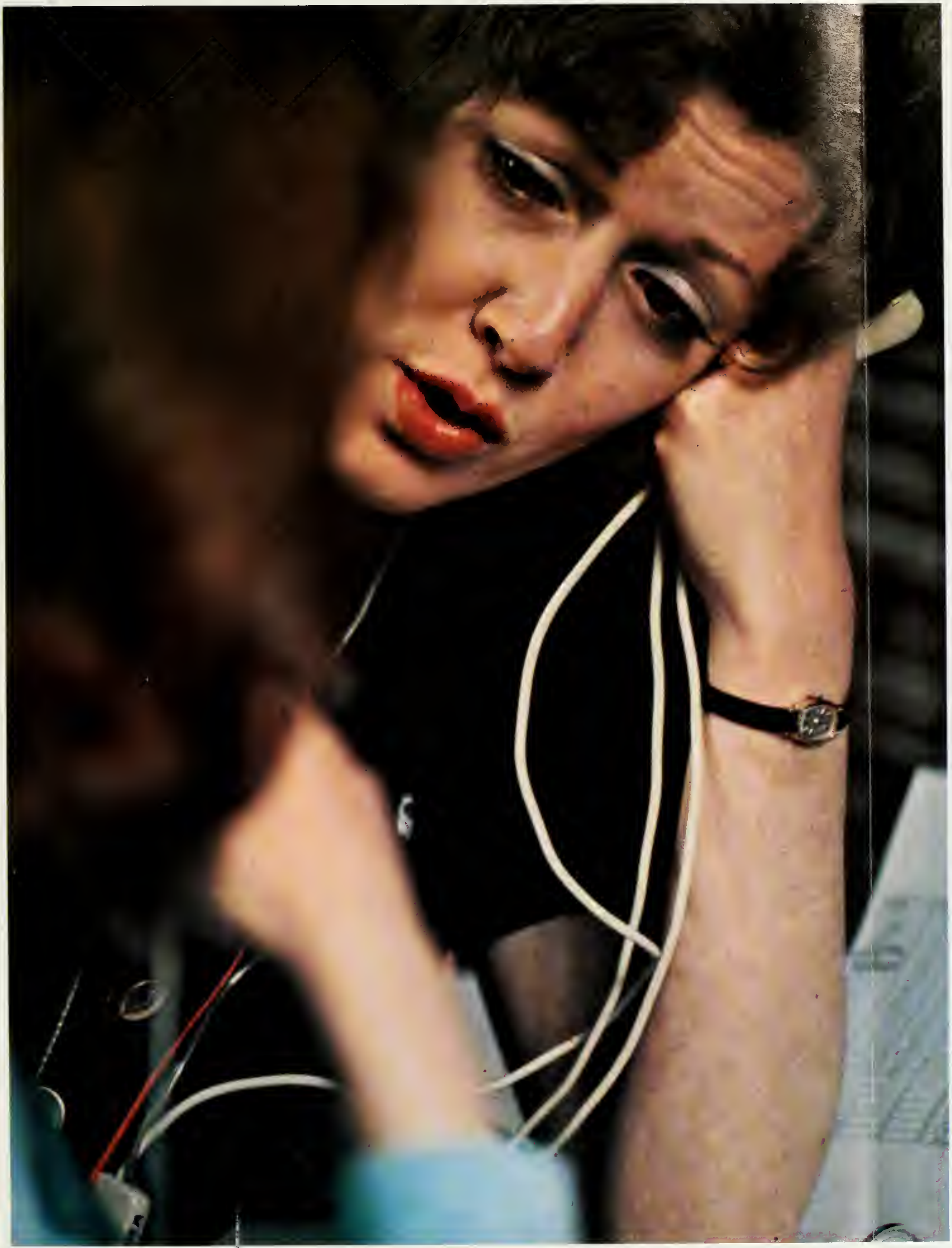
Early in the 1960s, the Bell System found itself caught in the throes of high turnover rates and correspondingly high employment and training costs. In certain locations and departments, that turnover rate was exceeding 100 percent. No organization can long live with that kind of churning. Something had to be done.

To get at the turnover problem, Dr. Robert N. Ford, now director, work organization and environmental research, AT&T, asked for the chance to introduce, experimentally, to a variety of work situations, the motivation theory of Dr. Frederick Herzberg.

At the core of Herzberg's theory is the observation that things that cause job satisfaction and things that cause job dissatisfaction are not simple opposites, and that the strongest sense of job satisfaction comes principally from the nature of the work.

As an oversimplified example: a man who dislikes his job of metal stamping may also resent the fact that he gets only two weeks vacation; doubling his vacation to four weeks, however, will not decrease, by half, his dislike for stamping metal. To get at the root of this particular problem, you have to see whether you can't do something about the nature of the work the man is being asked to do.

Most jobs, according to Herzberg, even the job of metal stamping, can be enriched by building into them an opportunity for personal achievement and recognition, by providing more challenging and responsible work, and by allowing more oppor-



NANCY FREEMAN, C & P of Va.

PAT BRICHANT, C & P of Va.

tunity for individual advancement and growth.

Dr. Ford felt Herzberg's theories, properly applied, could help the Bell System solve some of its high turnover problem. Dr. Ford reasoned that people being hired by the Bell System were every bit as bright and wanted to work every bit as much as those hired by other firms. Since the Bell System was competitive with other companies, paid good wages, offered a fine benefits program and unexcelled job security, there must be other reasons why our turnover rates were so high. Concluding that something must be the matter with the jobs we were providing, he set up experiments to correct the work deficiencies and enrich the jobs.

Turnover and morale

The results of those early experiments are documented in Dr. Ford's book, *Motivation Through the Work Itself,* and it isn't necessary to dwell on them here. Let it suffice to say that AT&T's highest management was impressed, strongly endorsed the effort and urged the widespread dissemination of the theories and their implementation. Thus, a formal indoctrination program was launched, and managers were exposed to the "Work Itself" philosophies, as they were then called, and encouraged to put the principles to practical use.

A little over two years ago, *Bell Telephone Magazine* visited a number of work locations to observe how the job enrichment principles were being applied to a variety of jobs (see: "They Really Want To Do a Good Job if We'll Let 'em," Jan/Feb 1971). The story carried glowing reports from both sides. Craft employees were delighted when managers removed some of the more restrictive supervisory practices and allowed them to take on added control of the work. Managers, in turn, were happy to note that in addition to improving morale and reducing turnover, frequently there were significant dollars-and-cents, side-benefit gains in productivity. It was an encouraging report.

Today, some form of job restructuring effort is underway in each of the Bell System operating companies, Bell Laboratories, Western Electric, Long Lines and the General Departments of AT&T. The degree of involvement varies, but the more inspired programs continue to produce the solid results of the earlier trials. It is conceded that some mistakes were made along the way, but we appear to have profited from them. And current efforts are geared to get more upper and middle-managers to accept the motivation theory and to redesign into better job modules the tasks of their respective work groups.

Taking the last point first, Dr. Ford expressed disappointment that some seven years after the early "Work Itself" experiments proved the value of the concepts, and despite the solid backing and support from top-level managers, less than 25 percent of all Bell System managers are making practical application of the techniques.

Dr. Ford says, "Down deep, I suppose we knew it would be this way. Making changes is always inconvenient, especially toward the unknown. Some managers just can't seem to let go. They're afraid to give up precise controls; afraid to depend on employees to perform their work. We know job enrichment techniques will work if they're given the chance. Now we've got to find the key to motivating middle and upper-level managers to try these job enrichment concepts within their organizations."

Conviction, not force

While Dr. Ford has a deep and abiding interest in getting Bell System managers to accept and use job enrichment techniques, he is currently devoting his attention to other aspects of organizing Bell System work. The assignment of implementing the job enrichment program has now fallen on the shoulders of Dr. Ford's first assistant, Malcolm B. Gillette, director, human resources programs, AT&T.

Gillette says, "We quickly learned that you can't simply order these concepts into existence. Wherever it's been forced on people, the program soon fails. A manager must fully understand the concepts and believe that through job restructuring he or she will be able to improve bottom-line results. Our job, then, is to convince the managers that the rewards really merit the risks. We'd rather move slowly, giving all the support and encouragement we can, than to try to rush it. We want managers who are concerned about improving results to give job enrichment a chance to prove its own worth."

Beachhead programs

Gillette's approach has been to work with those general level managers interested in establishing beachhead programs within their respective companies. Once the programs are well underway, they can be used as stepping-stone examples to other departments and other areas within that same company. Even on those rare occasions when a program falters, other managers can learn from the experience and avoid the same pitfalls.

Nancy Freeman, manager of operator services, Jackson Toll Office, Chesapeake and Potomac Telephone Company of Virginia, can testify to the delays that can develop if job restructuring gets started on the wrong foot.

Mrs. Freeman says, "I went through the program's Workshop some two years ago and was convinced that the toll operator's job could and should be made better.

"After meeting with the group chief operators and discussing just what we could do to enrich the operator's job, we then identified some 17 operators we felt had the potential for taking on the added responsibilities called for in the newly designed job modules. We wanted to give this select group some recognition, so we dubbed them 'professionals.'

"Our mistake was in announcing the status of this select 'professional' group to the whole body of operators without sufficiently explaining what we were trying to do. It was like unleashing a tornado. A number of the older operators with long years of experience really took offense. They said they had always regarded themselves as 'professional' operators, too, and their names were not on the list.

"Things got so emotionally charged that we simply dropped the program and let some four months slip by without doing a thing. When we finally began implementing the job changes, we did it quietly, without fanfare. Those permitted to take on added control of their work were now said to be 'high achievers.'

"In the end, we accomplished what we'd set out to do and we're certainly pleased with the results. My one regret is that we lost momentum for several months as a result of that one mistake."

It's one thing for Nancy Freeman to say she's pleased with the results. She helped design the changes called for in the operator's job module. What about the operators who have to live with those changes? Are they equally pleased?

An operator's experience

"I, for one, certainly am pleased," says Jackson Toll Operator Pat Brichant. "I've seen changes made that I certainly appreciate. For example, in the past, when a new practice would come in, they used to sit us down and read it to us like a bunch of kindergarten children. Now they pass the practice around and we read it ourselves. Qualified operators are now allowed to handle their own emergency calls and nuisance calls without bringing the supervisor in—they're also exempt from Operator Achievement Analysis observations. A new system permits 'necessary' trips away from the board without getting permission from the supervisor and the number of trips aren't counted.

"All in all, there is a lot more trust shown and we're finally being treated as the adults that we really are. I know of no cases where that trust is being abused. It's funny, but if people show they have faith in your doing the job, you go ahead and do it. When they stand over you watching every motion you make, you're inclined to be less productive. I've been in the office long enough to have seen the effects of the new 'freedoms.' I wouldn't want to go back to the way things were."

Pat Brichant's comments are typical of most telephone employees who have been given the opportunity of planning and controlling much of their work. Operators, service representatives, installers, plant

absenteeism and turnover rates, wildcat strikes, and sabotage . . . Those who have been urging increased worker output are reexamining the problem . . ."

BUSINESS WEEK MAGAZINE

"I still say it's spinach and to hell with it. Job enrichment is just another passing fad. You watch. Just let us have one good recession and you won't hear anything more about it. These prima donnas we've been running through, in and out, faster than you can bat an eye, will be lined up begging to do those jobs they were too good to do before. Only then the shoe will be on the other foot. We'll be the ones to say 'Sorry, you just aren't what we had in mind.'"

A MANAGER'S COMMENT AT A
RECENT WORK ITSELF WORKSHOP

"Our traditional approach to turnover has been to open more employment offices and hire more interviewers. This is as useful as a doctor treating a serious hemorrhage with a blood transfusion. Necessary in the short run, but you had better plug that leak.

"In many areas with a close-control management climate, job restructuring today is easy not to do. When we describe the philosophy behind it, these management people tend to look at me like I'm some kind of nut waving a torch

JIM MARTIN, So. Bell.

HENRY CORDES, So. Bell.

foremen, service order typists, key punch operators and communications advisors, among others, all say nearly the same things. Once they've experienced an enriched job, they find they are a lot more satisfied with their work and they don't want to go back to the old routines.

Old ways die hard

With all the evidence that's accumulated to indicate the positive values of this new form of management, why do some managers seem so reluctant to give it a whirl? Jim Martin, Commercial Practices and Training Supervisor, Southern Bell Telephone Company, and an early and enthusiastic supporter of job enrichment, volunteered a few of the reasons.

"First off," Martin says, "some managers just can't accept the concepts. The foundation of the program rests on tailoring jobs to fit the skills and abilities of each individual in the work force—some doing more, some doing less. Some managers are just not accustomed to thinking this way. They've been ingrained with a philosophy that says in order to treat people fairly, you have to treat them all the same way. Now, along come these new theories that tell you to give up these cherished ideas and start treating people differently. Some managers have a hard time swallowing that.

"Another thing," Martin continues, "most managers are accustomed to programs that have a clear beginning, middle and end. You start, check to see where you are and then finish up. You just can't do that with Work Itself. You can start, for example, by recognizing that reporting to you, you have a top-notch man and some people who are just average. You can give the top-notch man all the responsibility he can handle, while more closely supervising the rest. Then the inevitable happens. Your top-notch man gets promoted, others get transferred and you have to juggle the staff. Things just aren't the same as they were before. You don't have the same people. So you have to start over again.

"However, the thing that's behind most managers' failing to institute restructured jobs," Martin concludes, "is sheer inertia. It's hard to convince a manager whose service index is 97 or 98 that he should begin tinkering with his personnel policies. While he may fully agree that enriched jobs make for happier employees, he feels no pressing need for making changes. Suppose he makes changes and things slip, how's that going to make him look to his boss?"

Mal Gillette says, "We are aware that these and other objections do exist, but we know they can be overcome. We've seen it happen time and again. We're like that guy in the television commercial saying 'Try it, you'll like it.' Once persuaded, few managers regret having expended the necessary effort. Once they've seen how well people take to redesigned jobs, some of the skeptics seem to become our very strongest supporters."

Doing is believing

One man who admits he was skeptical at first, but is now completely sold, is Southern Bell's Jacksonville District Plant Manager, Henry Cordes. Cordes began rearranging the central office foreman's job in May, 1969, and it was Southern Bell's first in-house experience with job restructuring.

"I had some real problems a few years back," Cordes says. "Morale was bad and I was losing people. That's when someone suggested we consider putting Work Itself principles to use. I didn't know what that was, but I attended a workshop and found out. Quite frankly, even after the workshop, I still wasn't convinced that these new management techniques would help solve my problems.

"After holding meetings with my second-level people, we decided that if this thing could be made to work we ought to give it a shot. We began meeting every Monday night to discuss nothing but Work Itself. I think we really began to make progress when one of the boys said, 'Henry, if you want this to work, you're going to have to make some changes in the way you do things, too,' and he was right. I'd been holding a pretty tight rein.

"We concentrated attention on

'maintenance' items first. They were the easiest to spot and correct. Then we zeroed in on the central office foreman's job and really hit pay dirt; we found the target.

Foreman a foreman again

"The foremen are the key to our operating efficiency and the kind of attitudes they have affect large numbers of people, customers as well as employees. We felt it was important that the foreman's attitude and outlook be as positive and healthy as possible. How could we improve that attitude? Easy. We finally began to let him run his own job again. We gave back to him the things he should have been doing all along.

"Frequently bypassed before, the foreman is now the key contact with the craft employees. On personnel matters it is now the foreman who passes on information on raises, promotions and other benefits, and it is he who decides whether overtime work is needed to finish a job. When faced with technical problems, the foreman now deals directly with field engineers instead of going through channels. On the administrative side, many reports formerly required have been eliminated, as have many of the meetings that formerly took place. With less time spent on the non-essentials, the foreman now has more time to spend supervising the work.

"Has it worked? Our overtime is about half what it used to be and it certainly isn't because there's less work. Attitudes are better and turnover is down. You know how I know attitudes are better? We couldn't keep people in our Elgin step-by-step office. It's downtown and the only central office location where employees have to pay to park their cars. The other offices have lots. Now there's been such an improvement in morale in that one office that everyone seems to want to work there. I run into trouble when I want to transfer people out.

"Plant results for this district were in the acceptable range when we started the program—a 94 or 95 for the step offices and a 96 to 97 for the crossbar offices. After we put the concepts to work in the form of enriched jobs, we moved that index three points—not three-tenths of a point, but three whole points. The crossbar offices are at 98 to 99, and three of the step offices also hit 98's. The entire district hasn't been below 97 for a year. We're both meeting and beating Bell System objectives.

"The way I used to manage, I wanted to be prepared if my boss asked me a question about how some job was going. To play it safe, I used to ask a second-level man not one, but five questions. He'd want to play it safe, too, so he'd ask the foreman ten questions. The poor foreman was spending half his time chasing down answers. I was a little afraid we might lose contact when we started managing under the new system. But you know, it's worked just the other way. Now, without asking, the foremen tell me more about what's going on than they ever did. They not only tell me the problems, but what they've done to correct them.

"I was at another district before coming to Jacksonville and may move on from here to still another district, who knows? All I do know is that wherever I go from here, job enrichment will be part of the way I manage people."

Where to from here?

Just where do we go from here? On a System-wide basis, nobody wants to go back to the way things were. The high turnover rates of the Sixties, in addition to being terribly disruptive and wasteful of human resources, were also terribly expensive. It's no secret that each time a newly-hired employee leaves, he takes with him non-recoverable training costs that really mount up. According to force loss cost analysis studies, when an employee with less than six months service leaves, these costs are in the neighborhood of $1,150 for a directory assistance operator, $1,950 for a toll operator, $2,500 for an installer and $3,450 for a service representative.

Looking ahead, insofar as it's humanly possible to do so, Dr. Ford has started waving the red flag:

"Going into the 1970s, a somewhat softer economy and a six percent unemployment rate helped

in a dynamite factory. Or, they see it as a new program called 'You Bet Your Job.' They want to know if there isn't some easy way to go into the program gradually, without much risk. We point out that, once you start, you can take as much time as needed—but that you've got to start. As John F. Kennedy said, 'You can't cross a chasm in two small leaps.'"

NEAL GREENHALGH
HUMAN RESOURCES MANAGER, AT&T

"Our intention is to treat employees as mature, responsible individuals who have the capacity and the desire to do work that is useful and constructive. We want them to be able to feel, regardless of their level in the organization, that they are accomplishing significant work in the business. We want to provide them with the opportunity to make the best use of their time and talents so that they experience a sense of dignity and self-worth in their jobs.

"We can't change employees' attitudes toward their jobs and their companies unless we give them a good module of work, control over it if they are competent, and effective feedback.

"We are still a long way from fully implementing this concept of job enrichment throughout the Bell System, but it should be clear to everyone that this is something that has the complete support of the top management of the business."

R. D. LILLEY, PRESIDENT, AT&T

"When I first started, we didn't have designated accounts. If a customer called in, he'd get one person one day and another person the next. The customer was spending a lot of time educating us. Then the change came. I was given my own accounts. I plan my own contacts and deal with my customers. I get to know them and their needs a lot better, and they get to know and trust me. I know if he's going to start throwing a name around—whether good or bad—that name's going to be mine, so I really want to do right by him. I'm a lot happier now that I've got my own piece of the rock."

BRENDA BLACKBURN,
COMMUNICATIONS ADVISOR
SOUTH CENTRAL BELL

"One of the keys to success is the supervisor's ability in knowing his or her people, and working with them on a regular basis to develop their potential. At the same time, each supervisor has to recognize when additional responsibilities ought to be introduced. It varies from individual to individual and it really makes you earn your keep as a manager."

PETE LANSDALE,
COMMERCIAL MANAGER C&P OF VIRGINIA

BOB FORD, AT&T.

stem some of the high turnover the Bell System had experienced. While this has given us a little breathing room, we've got to be careful not to rest on our oars. The unemployment rate has already dropped to five percent nationally and is likely to continue in that direction. But that's not what worries me.

"Looking ahead some ten years, we see the need for a Bell System work force numbering between 1,200,000 and 1,300,000 persons. That's a 20 to 30 percent increase. We're already wondering where we're going to find all the people we'll need. I hope, by then, we're not still wondering what we can do to keep them once we get them. I'm firmly convinced that the answer lies in making our jobs as attractive as we can, not only in terms of wages and benefits, but in terms of providing meaningful and satisfying work to the individual."

The nesting concept

What else is in store for the future? Dr. Ford is hard at work researching and evaluating the concepts of "nesting" related, already enriched jobs and examining the possibility of improving jobs by rearranging and cutting across traditional departmental lines.

As he describes it, "Southwestern Bell's study enriching the jobs of its service representatives and service order typists in the Ferguson District near St. Louis so impressed me that I reported on it in detail in the January/February issue of *Harvard Business Review.* That study convinced me that we need to pour some effort into studies of new ways to put enriched jobs together. When you've done all you can for two related jobs, there may be added payoffs merely through care in how the two are put together. The Commercial Department proposes that we work together to mount three similar trials, along with three matched locations held as control groups, and organize and combine the jobs of service representative, service order typist, teller and related clerical people into as many configurations as we can in order to maximize performance. We're not simply trying to increase production. We are deeply committed to the idea that employees will find attractive those jobs upon which they perform well. Hopefully, these studies will help make it possible for employees to perform to their full potential.

MAL GILLETTE, AT&T.

PhoneCenter clusters

"Some ideas we have for improving jobs through different organization of work would necessitate cutting across departmental lines. Here, good results will be harder to accomplish than was true in the Ferguson study, where only one department was involved. But it can be done. So far as we have investigated, the PhoneCenter is such a concept, and from the employee's point of view, it is a dream ahead of most work situations.

"Those few employees who have worked in the PhoneCenter loved it, and the PhoneCenter certainly appeals to customers. But there are organizational problems. How can we live with an organization where the service rep reports to a B.O.S. uptown, and the installer reports to a foreman across town? What if we had a PhoneCenter Manager, responsible for five or six PhoneCenters? Can we get ten such locations started, where the natural base is territory and the natural responsibility for all employees in it belongs to the manager of that territory? Under this concept, Traffic is still on its own and the traditional departments feed prepared employees to the natural territory, perform planning and construction and staff functions, but do not operate in the territory. This could become truly a testing ground for an entirely new concept."

Whether a simple one-to-one, supervisor-employee relationship, the nesting of two or more related jobs, or the creation of an entirely new type of territorial organization, job restructuring concepts are here to stay and are slowly but surely being implemented across the Bell System. An enriched job may well be the answer to the employee's cry not only to "treat me well," but also to "use me well." As the late President Lyndon B. Johnson once said, "To hunger for use and go unused is the worst hunger of all . . ."

William P. Kuhs, Associate Editor

A Fresh Look At Costs As A Factor In The Service Equation

by M. G. Killoch

In this era of emerging competition, the matter will be of increasing importance to the Bell companies.

Perhaps the only unchanging attitude today is the conviction that we're living in a period of change. Whatever the case may be in separate segments of society, our immediate experience as a business certainly supports that view. Apart from other developments affecting its character and structure, the economic nature of the communications industry has changed over the past decade from that of a wholly regulated monopoly to one with increasing elements of competition, especially in the markets for terminal devices, intercity private lines and data services.

Concurrently, as a consequence of such changes, there is a growing interest in the costs of communications services.

To begin with, cost "philosophy," if you will, does not exist in a vacuum; it interacts closely with price philosophy. In turn, price philosophy is directly related to the jurisdictional and economic environment of the communications industry. In the past, this environment defined a pure, regulated monopoly and the approach to costs was influenced by: (A) Jurisdictional separations of state and interstate regulatory domains. (B) Settlements that governed the division of revenues among separate common carriers involved in providing a nationwide communications service as a common venture. And (C), pricing based on the value of service to the ustomer.

The cost methodologies which ave been used in separations and settlements (A & B) were selected for reasons of contractual efficiency. The difficulty of identifying the physical elements of the plant used in common between state and interstate services led to the use of certain cost conventions as the most efficient and contractually satisfactory way of dealing with a highly complex technical problem. It afforded a way to define or "separate" jurisdictional domains and the extent of the several carriers' portions of the service provided. Such cost allocations were determined by contractual rather than by wholly economic rules, the important thing being that a rough consensus of satisfactions among parties could be achieved, at least temporarily. Dissatisfactions were adjusted by revising contracts and obtaining a new consensus to modify the basic separations or settlement plan.

In this environment, costs were cast in the role of price; that is, the costs determined the contracts between common carriers just as if they were the prices that usually serve as the basis for negotiation between contracting parties. This contractual methodology had been so ingrained throughout the industry that many people in it looked upon costs so developed as the only kind of costs to apply in determining all prices. So long as the contractual device of substituting costs for pricing by value among the carriers was fully recognized, no harm was done, since the social fabric was quietly and efficiently preserved —"efficiently" here meaning that the

VALU
SERVIC
COS
REGULATIO

contracting parties continued to cooperate satisfactorily.

As for the relationship with the customer, value of service pricing (C) was the prevailing price philosophy and it, in that context, was also an instrument of social efficiency. It assumes that rate base regulation of rate of return on capital leads to an expression of total revenue needs, and then sets out to spread the rates to get these revenues among services on the basis of their relative values to users. Prices for service in large exchanges were set higher than in small ones, since there is a higher value in being able to reach more telephones in a local area. Business service was priced higher than residence. Short haul toll was priced low and long haul was priced higher. Revenue returns by classes and entities were averaged over a state to meet total revenue requirements.

Value of service was and is an efficient social instrument because its inherent flexibility allows both regulators and the regulated to adopt pricing geared to social ends (e.g. Theodore Vail's concept of universal service, based on national average pricing), rather than to purely economic ends (e.g., ability to pay). The many public interest problems facing regulators require a highly flexible approach, unencumbered by the dictates of an arbitrarily imposed cost standard.

Further, value of service pricing does not require a huge assignment of manpower to develop costs of services. (One such study was estimated to cost more than 12 million dollars for one test period). In the last analysis, the consumer must pay for such studies; value-of-service pricing, in that sense, has saved countless millions of dollars.

Value of service is efficient

Today, this price principle has been severely criticized because of its allegedly arbitrary nature, but such criticisms of the principle fail to give due recognition to its efficiency for regulators and its savings to consumers in general. The question of its "fairness" is a reasonable and rational question to ask; but extrapolation of "fairness" to the proposition that equity equals cost indicates that the proponents of such a theory of equity do not understand the nature of costs in communications.

Assume, for example, that one customer lives five miles from the telephone switching center, and another five blocks away. It has long since been agreed that calculating *costs* by distance from the local center to determine *price* would be inappropriate.

The path of reason

Further, the economic analysis of such costs must be in accord with the existing philosophy of wire center selection–under which the goal of providing service is to minimize the total costs for all customers together. Since this overall minimization of costs to all customers together *is* the goal and special treatment of some customers is *not* the goal (since the total costs would be greater), then there is no equitable way, on a "philosophically" sound basis, of pricing customers on their distance from a switching center which was located originally to achieve the best economies for all. Such pricing would improperly discriminate against marginal customers.

Here is the value of service principle at work, responding properly to the underlying cost problem by not discriminating in prices by distance within a central office area. A regulator would be expected to see at once that the social considerations involved far outweighed the apparent dictates of the cost analysis. Hence, regulators are not prone to impose on the regulated company the problem of determining the costs of serving each customer.

Another important fact is that communications are furnished by plant used in common for many services and that these services do not have a common measure of output, such as the kilowatt in the electric power industry. Telephones, cables and central offices provide in common many forms of local, state and interstate services. For example, the bewildering array of services and terminal products amount to some 2200 items in New Jersey Bell Telephone's published tariffs. Calculating the cost of each item of service separately has been estimated to entail expense of $15- to $25 million for one test period. Obviously, regulators should not be eager to impose such expense on ratepayers. Such high outlays to determine service and product costs stem from the variety of communications facilities and the intermixture of services among common elements, making both analysis and data gathering truly formidable jobs. The value-of-pricing principle recognized these problems of cost determination and served to avoid imposing the added cost of analysis on ratepayers. It can be expected that regulators would choose the path of reason, using the value principle to solve their public interest responsibilities at lower cost to the ratepayers.

On another front of contention regarding the efficiency of regulation, one hears a good deal about the problem of innovation under regulation as compared to that under competition. Despite a comparative lack of competition in the past, the communications industry has been highly innovative. This is all the more impressive because the economics of innovation is much more stringent under a regulated monopoly than under a competitive situation. While regulation has been charged with stifling innovation, those who make the charge have overlooked, or have failed to consider fully the cost of innovation. Large scale but economically unsound innovation has been avoided by regulators and the industry alike; due credit should be given to both. Both have worked to introduce innovations while keeping telephone rates low by applying innovation to economic growth opportunities rather than by large scale, uneconomic replacements.

The pressures for analysis

Today, four groups are exerting pressure for more attention to the analysis of costs for services: consumers, competitors, regulators, and the regulated. These pressures arise from consumers responding to the impact of inflation. They arise from competitors demanding that unfair competition by common carriers be restrained. They arise from regulators who are concerned that rate proposals based on value of service may be unduly discriminatory, that cross-subsidies of competitive by monopoly services may occur, and further concerned over the ultimate effects of common carrier market erosion (by competition) on basic telephone service charges. And they arise from the regulated, who are concerned with declining returns on capital in the face of an unprecedented need for capital to expand service.

Competition: the key word

Examination of these often conflicting concerns suggests two fundamental factors at work. One is inflation; the other is a changing trend in the institutional form of regulation which is tending to introduce competition into the realm of the regulated monopoly.

By now, it is a truism to say that inflation has in general outrun productivity. Prices, held reasonably stable over a long period, now must rise sharply to produce earnings to attract enough capital to meet ever increasing demands for service. As price is held down and incomes rise, the value of telephone service induces more demand. As price is held down, in the face of inflation outrunning productivity, earnings erode. The circle is, indeed, a vicious one of downward spiraling earnings. Despite this erosion, consumers are up in arms to halt inflationary price increases.

The area of telephone pricing is no exception. Higher prices are necessary both to bring earnings to a reasonable level and to inhibit, in part, overriding demands for service. But market forces may make it impossible to increase the prices for all services in the same proportion. In the case of services subject to competition, for example, substantial price increases might lead to such a reduction in demand that the contribution of such services to the firm's total earnings would be reduced rather than enhanced.

Consumers and regulators alike try to limit price increases, while the regulated see higher prices as essential in order to raise earnings high enough to attract capital for expansion. Competitors, also suffering from inflation, want common carrier competitive prices to rise so that they are assured market entry and a market share. On the other hand, these competitors do not wish monopoly market prices to rise and generate revenues which they fear may be used to subsidize lower prices for common carrier competitive products and services. One of the fundamental guidelines for all parties rests on an enhanced knowledge of costs by services.

In this context, "competitive" is now the operative word. As we said at the outset, the environment of this business has changed, and is changing, rapidly: the door to competition has been opened and the regulated monopoly must learn to compete, at least in areas where it is allowed to. One of those areas embraces voice grade private line services, which, until now, have been priced on a single, nationwide average. But now, new carriers are entering the field with full rights to offer identical services over the same routes already served by the Bell System. These carriers, not operating a nationwide network, can set rates for their services according to what it costs to provide them without having to worry about any nationwide average or the long range effect of the rates on millions of other customers.

New rates based on costs

The FCC ruling allowing such direct competition was, however, not a one-way street, since the Bell System may play the game, too. Since these private line services are no longer monopoly services, and since the specialized common carriers can undercut Bell System rates on high density (heavily used) routes where costs are lower, AT&T has asked the FCC for authority to revise its private line rate schedules to reflect more directly the costs of providing the service over different routes. This, of course, is a radical departure from our traditional principle of uniform, nationwide rates based on nationwide average costs, but it is important that we make the departure now. If we do not make competitive offerings now, where we can, in a very few years users of the other services—principally interstate long distance—may be paying millions of dollars more each year than they would otherwise pay because of private line revenue we would lose to competition.

In our industry, as we have seen, there are costs common to the total operations which cannot be allocated specifically to any part of them, and these costs must be recouped. Now, to the extent that competitive services can contribute revenues above the costs of those services, we can reduce the burden of unallocable costs on the monopoly services. I believe that we have a powerful social imperative to engage in competition wherever it will contribute such revenues. To do otherwise would be to run counter to our social responsibilities to the national communications effort.

It seems to me that many young people today criticize corporations on the ground that they have not embraced a true social ethic. I believe the Bell System has, indeed, a a social ethic, part of which certainly is our primary mission to give basic service on the widest possible scale. And certainly our effort to engage in competition is directly in line with this ethic, for by competing successfully we can keep the price of local and long distance service lower than we could without competing. Our imperative is to obtain the greatest contribution to overheads that we can from competitive services. In this way, we can allow the entry of the consumer at the marginal income level into the telephone using market.

Is this, then, the shape of things to come? I think it must be. A great deal of thinking and talking about the proper role of costs is taking place among the regulators and the members of the telecommunications industry. The resolution of that role is of prime importance in this era of emerging competition. The operating units of the Bell System will find themselves under increasing pressure to provide cost information for regulatory review and must at the same time avoid disclosure of proprietary market and cost information to competitors who would "cream-skim" the markets. The name of the game will be to know the costs, both for support of pricing and efficiency of operation while keeping such valuable information from the competitors.

Mr. Killoch is Assistant Vice President, Engineering Service Costs.

A thing of beauty is a joy forever...but can it house a telephone facility?

a Report on Bell System Architecture

Raritan River Center, Piscataway, N.J.

To the poet Goethe, good architecture was music in stone. A crasser observer said, "It's good architecture if it keeps the rain off the chickens." One source book defines good architecture as the integration of function and construction in a design that transcends both.

However described or defined, architecture clearly satisfies (or should satisfy) two basic needs: shelter and the expression of a particular design idea or concept.

In the System the effort to satisfy these needs is tested almost a thousand times a year. That is the approximate number of buildings and additions to existing buildings being constructed annually by the associated operating companies.

Apart from the System's 100,000,000 telephones, our buildings are the most visible expressions of who we are and what we do. Currently, the System's people and equipment are housed in more than 22,000 buildings.

These buildings are of all shapes and sizes. Some are plain, practical masonry cubes, while others may be wedding-cake structures of an earlier time, adorned with columns, arches, gargoyles and frills of virtually endless variety. And some of the more recent structures are gracefully united statements in concrete, brick, and steel, proudly reasserting the proposition that common building materials can be formed into things of beauty.

There is virtually a style of architecture to please everybody—though that is not necessarily a System goal. In fact, it may even be a source of discomfiture for the equipment and building section under Warren H. Turner, engineering director at AT&T headquarters.

"We're not trying to urge conformity on the System," Turner pointed out, "There is no master building plan, as such. All we attempt to do, in our capacities as advisors and consultants to the System, is to encourage design excellence with respect to the requirements of people, function and cost."

As a day-to-day matter, the goals of design excellence are the concern of Donald T. Lyon, engineering manager-buildings, and his assistant, Helen Armstrong.

They are advisors, trouble shoot-

NYT, switching center, N.Y.C.

ers—Dutch uncles when necessary—and, in general, information clearinghouses for their colleagues in the associated companies.

"On the whole, the System does a fine job of satisfying the criteria of architectural excellence," Lyon said. "Generally speaking, we erect good looking buildings that serve their purpose, are comfortable to work in, and give us our money's worth. Now and then we get a fluke. But I suppose that's to be expected when you put up as many buildings as we do a year."

The Bell System's architectural goals haven't required major re-appraisal due to recent general concern for environmental protection.

"One of our goals has always been to fit in with the environment. We work with the communities we want to build in; we try to achieve a design that will be neither disruptive nor indifferent," he said.

In an endeavor to stimulate and encourage excellence in the architectural design and planning of System buildings, AT&T has held periodic architectural awards programs. They began in 1960. There have been over 2,000 entries since.

Under the direction of Lyon and Miss Armstrong, the seventh program was held this year. Associated companies may submit slides, photographs and construction data concerning buildings or other architecturally significant structures—including, for example, relay stations and towers—to a judging by a panel of architects. Entries must have been completed subsequent to the previous (biennial) contest.

The architects chosen are recognized professionals, some who may not have done Bell System buildings. They may make awards in three degrees: "Honor—Highest;" "Merit—Second Highest," and "Honorable Mention." They may declare as many (or no) awards as they deem worthy in each category.

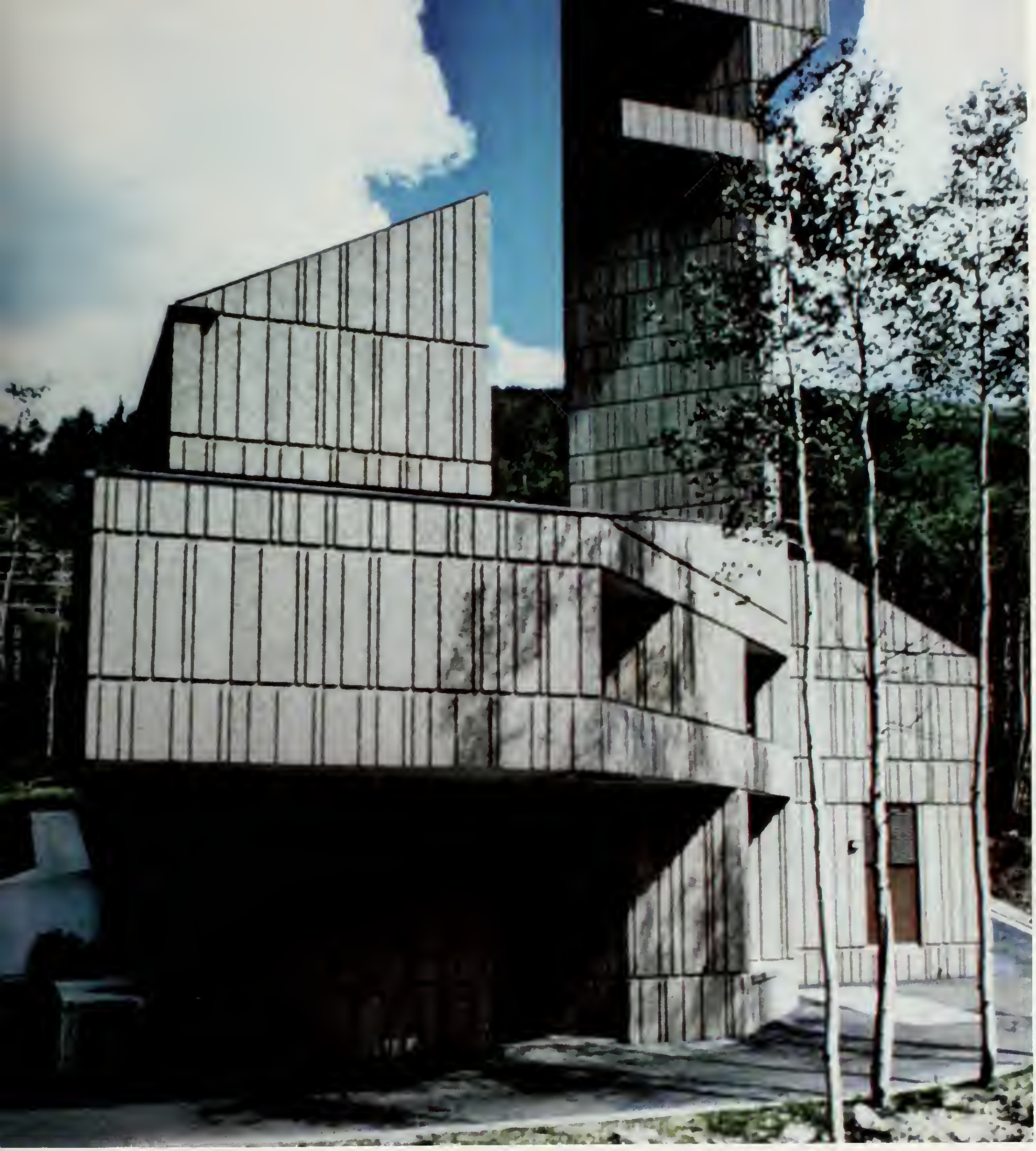
This year, in February, the judging was undertaken first in three regional showings: in Denver for companies in the western states; in Chicago for the central U.S.; and in Philadelphia for the eastern region. There were 391 entries all together. Of these, 22 were given Honor; 15 Merit; and 27 Honorable Mention awards. For the first time in any of the programs a "special

SNET, Stamford, Conn., equipment center.

SWB, Harlingen, Tex., microwave tower.

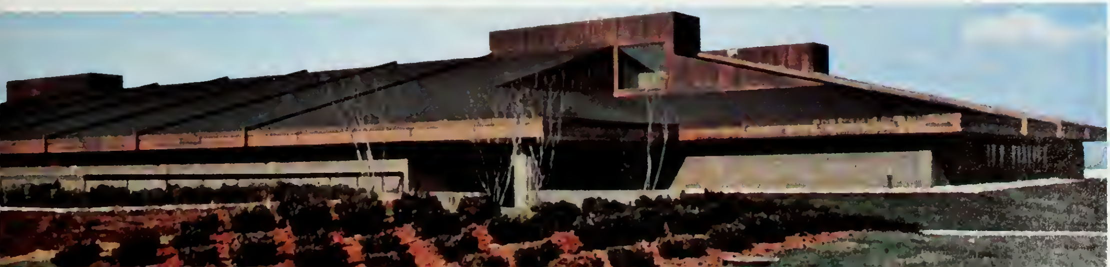
Raritan

Raritan



Bell, Vail, Colo., No. 5 Crossbar office.

Wisc. Bell, Waukesha, Wisc., operator service center.



SCB, Birmingham, headquarters.

Raritan

SWB, Waco, Tex., relay station.

SWB, Dallas, Tex., TSPS office.

Raritan

of Can., Scarborough, Ont., equipment building.

Bell of Pa., Phila., central office.

SWB, Topeka, Kan., regional headquarters.

citation" was given to an interior renovation and remodeling project, the auditorium of the Southwestern Bell Company's headquarters building in St. Louis.

Final judging took place at AT&T headquarters in New York in April. From the 65 previous citations in the regional contests, 17 entries received National awards in five categories. There were four National First Honor awards; four National Honor awards; five National Merit awards, and three National Special Mention awards. For the first time a National Special Honor Award was given to Michigan Bell Telephone Company for a public mall, a cooperative effort with the Birmingham, Mich., City Hall project.

These are the official criteria for judging:

Excellence in Design:

Pleasing and gracious architectural solution to demands of occupancy.

The design should be adaptable to future building expansion.

Appearance–Fitting Surroundings:

The best approach for the location. Enhances appearance of the neighborhood and is a good neighbor.

No architectural style should be ruled out providing it is compatible with the surroundings.

Planning:

The building layout should be efficient, functional and adaptable to future expansion.

Corporate Character:

The building should say the company is progressive, alert, and a leader responsive to the community.

Cost:

It is each company's responsibility to assure that the cost of any addition is reasonable for the particular location and time of construction.

Judgment, not Comparison:

Each entry should be judged as an individual solution to its own particular problem. Awards should be based on the excellence of that solution, considering all factors without regard to the comparative merits of other submissions. The jury is free to designate many, several, or no awards at all, as it sees fit.

These pages present some of the evidence on how well the criteria for excellence are being met. ☐

SAINT LOUIS
MO.
U.S. POSTAGE
PAID
PERMIT 462

KANSAS CITY PUB LIBRARY CC1
PERIACICAL CEPARTMENT
KANSAS CITY MC 64106

AT&T

American Telephone and Telegraph Company
195 Broadway, New York, N.Y. 10007

Moving? Please inform the *BTM* circulation coordinator in your Bell Company's Public Relations Department. **Please include the mailing label from this issue.**

Printed in U.S.A

Printed on recycled paper.

Bell
TELEPHONE MAGAZINE

SEPTEMBER-OCTOBER 1973

KANSAS CITY, MO.
PUBLIC LIBRARY
SEP 2 5 1973

I made my fifth call to your service department.... I asked, 'Do I have to go to New York to get my phone service restored?' He retorted, 'You can call whoever the hell you want, but it won't get your service a damn minute sooner.'

John deButts asks if we are really listening. page 2

Bell
TELEPHONE MAGAZINE

VOLUME 52 NUMBER 4 SEPTEMBER-OCTOBER 1973

2 **"We hear you . . ."**
By John D. deButts
AT&T's Board Chairman talks about the urgency of really listening to our customers.

6 **Productivity Bargaining: Invitation to Inflation**
By Kenneth H. Militzer
Balance rising labor costs by an increasing output-per-manhour? It's not that simple.

12 **What Has Western Electric Done for Us Lately?**
By John McFee Brown
WE still provides what's needed when it's needed, at reasonable cost—but some new methods may mean a difference in the Bell System's future.

16 **Mobile Is Moving**
The new high capacity system could put good, uncrowded mobile telephone service at the average citizen's fingertips anywhere, any time.

20 **Managing the Money Managers**
By Bill Burns
AT&T's Assistant Treasurer tells how we oversee the professional investors who manage investments for the Bell System's pension fund to minimize risk and maximize return.

26 **Energy Today and Tomorrow**
By A. J. Meyer
The world's fossil fuel stores are still huge, but there is shortage in the face of plenty. The future demands practical solutions.

John D. deButts
Chairman of the Board
Robert D. Lilley
President
William L. Lindholm
Vice Chairman
Frank A. Hutson, Jr.
Secretary
William L. Mobraaten
Treasurer

Leonard Moran
Editor
Al Catalano
Art Director
Donald R. Woodford
Managing Editor
Edward J. Swartz
Associate Editor
William P. Kuhs
Associate Editor

Published by
American Telephone
and Telegraph Company
195 Broadway,
New York, N.Y. 10007
212 393-8255

In the past, we had more frequent contact with customers—as they made their calls, as they paid their bills, as repairmen visited their homes. There are fewer such contacts today. Dial service was developed to handle a growing volume of calls, the vast majority of people now pay their bills by mail, and modern telephones require considerably less maintenance. As our technical efficiency increased, the number of personal contacts decreased. But these contacts are as important as they ever were—if not more so. In that light, AT&T's Board Chairman gives some of his views on the necessity for all employees to be responsive to our customers' individual needs and concerns.

When we tell customers, "We hear you," we'd better be listening.

by John D. deButts

If you were to sit at my desk and read and answer the mail I get about telephone service, you'd come to realize, if you don't already, how much "little things" mean; how sometimes lifelong impressions of the character of our business are formed on the basis of a single contact with just one employee. Rather significant, I'd say, when you consider that the Bell System employs more than a million men and women.

You know, it's only natural when a customer feels service is poor or when he thinks his bill is too high that he is going to register a complaint with someone. But in all my years in this business, I can't recall ever receiving a letter that complained solely about cost or service. No, the key element in all the letters of complaint I get is how the customer was treated by an employee of the company. As a matter of fact, I'm sometimes amazed at just how tolerant our customers are of situations that to me would seem intolerable, before poor treatment by an employee finally pushes them to write to me or to one of the other officers, or to a public utility commissioner.

So that I don't give the wrong impression, let me add that intermixed with those complaints are a goodly number of commendation letters. And commendation letters, of course, always talk about how an employee treated the customer in a manner so unusually satisfying that the customer felt compelled to write to me about it.

I'd like to share portions of some of those letters with you. Here's one from a man in New Jersey:

Today, Saturday, at approximately 9:30 a.m., my next door neighbor rang my door bell to advise me that either my power or telephone line had pulled loose from my home and was lying across the street where cars coming and going could have caused a serious problem.

I went out to investigate, when, at the same time, one of your New Jersey Telephone trucks was approaching. He immediately pulled his truck to the curb, hopped out and raised the line from the road. Without any words from me, he took his ladder down from the truck and proceeded to reinstall the line to the house and make necessary repairs.

I then spoke to him for the first time. He had been in the vicinity making a phone installation, and spotted the trouble...I thanked him . . . I feel that AT&T and New Jersey Bell should be mighty proud to have a man like that working for you.

The customer was right. We *are* proud to have such a man—the kind of employee who epitomizes the Spirit of Service we used to talk so much about in the old days, and who possesses that "sense of proprietorship" we've been talking about more recently. We wish all our employees showed the same sense of judgment and concern for a customer's problem. However, in an organization as large as ours, there are bound to be some weak links.

Here's a letter from a customer who also happens to be a share owner:

My telephone has been out of order for the past four days. On April 8, 1973 at 7:00 p.m., I made my fifth call to your service department and was told, as I had been told four times previously, 'We'll take care of it.' I asked for his name and he refused to give it. I asked for the identity of his supervisor and again was refused . . . I asked, 'Do I have to go to New York to get my phone service restored?' He retorted, 'You can call whoever the hell you want, but it won't get your service a damn minute sooner.' Further discussion was pointless and I hung up.

The policy of permitting employees that have contact with customers to retain anonymity from behind Ma Bell's skirts is poorly conceived and poor customer relations. I cannot imagine any other company operating with this policy.

Now, consider this letter for a moment. The customer had been without service going on five days when he wrote. Subsequent investigation showed that one of our own cable crews working in the area was causing the problem, and that the customer was without service for still another day. Repair had been diligently searching for the cause of the problem from the time of the customer's first call, but no one thought to tell the customer what was being done. Obviously, the customer has every right to complain about being without service, but what is it that he is really complaining about here? Not lack of service, but an apparent lack of concern for his predicament, and the rude treatment he received from an employee.

When you get right down to it, there's really nothing very complicated about maintaining good customer relations. The guideline has been around a long time. Just follow the Golden Rule. If we treat the customer as we ourselves would like to be treated under the same set of circumstances, our actions are bound to meet with his approval. When I look through the letters I get from customers, I simply ask myself, "How would I like to be treated if I were in that customer's shoes?" The answers are usually fairly obvious.

Back when I was president of Illinois Bell, we had a saying there that "You not only have to give good service, but you've got to convince the customer that he's getting it." Here's a letter to illustrate what I mean.

I am sorry to bother you but you should know about the poor service I had on the weekend.

Saturday, April 28, about noontime, I found I could not use my phone . . . I reported on my neighbor's phone, immediately. I asked them to please fix it right away as I am an elderly lady—83 years old —and live alone. They said they would come before 5 p.m. I waited for them all Saturday and at 6 p.m. a man came and said he would come back later. He never came into my home. I waited for him until 11 p.m. and then went to bed. This was very upsetting and frightening for me and I didn't sleep. After I called again, they finally came...at 3 p.m., Sunday. I have large telephone bills and want better service than this.

In this case, Repair dispatched a man to investigate, and he found a short circuit in a cable on a pole outside the home. He worked on the trouble from Saturday afternoon into the early evening but couldn't finish the job and told the lady he'd return. He came back the next day, completed the splicing by early afternoon and left. The lady, not realizing that the repair had been completed, called again from the neighbor's phone. Another man was sent to check the problem, found everything in order, and reported to the lady that her phone was back in service. At which point, the lady took up her pen to write and tell us how we had let her down.

Now, I'm entirely sympathetic with this lady and can understand how such a thing can occur. A colleague of mine had a similar experience with an air-conditioning repairman. The man came into the home, looked briefly at the air conditioner, put the cover back on, picked up his tools and left. My friend's wife thought he had gone to get something from his truck, but when she looked out, the truck was gone. She waited all day for him to return, but he never came back. A second call to the repair shop the next day brought the information that a new part had to be ordered and, until it was received, the repair couldn't be completed. How easy it would have been, in both of these cases, for the repairman to give the customer a progress report.

Here's an excerpt from a letter I received from another share owner, one who had recently moved, relating an experience he had in merely inquiring about the types and cost of phone service:

> ***...I encountered a faceless voice that first demanded answers to a long list of questions, many of them personal, very few of them that could have any bearing at all on the answer to my inquiry. Rightly or wrongly, I became irritated by the manner of my interrogator and when I recognized she was more interested in obtaining answers than she was in being helpful, and the questions had become so absurdly irrelevant to my request...I terminated the interview.***

Now service representatives, obviously, must ask some questions if they are to do their jobs properly. But they should be flexible enough to know when to draw the line. When a customer begins to show irritation, as this one did, it's time to put aside the set routine. Fewer customers would have to be put through such prolonged fact-gathering if we spent just a little more time listening to what it is that the customer wants from us.

Finally, in the interest of balance, here's a note with a happy ending—from a customer who had a disappointing experience with one operator, only to have her faith restored later by the patient, resourceful service she received from another operator.

In contrast to her experience with the first operator, the customer had this to say about the second:

> ***. . . [She]*** **listened** ***to me, investigated the situation and had the courtesy to call me and explain that the number was out of order, that no report had been made to that effect earlier, but that she had done so.***

Note the key word in this letter. The operator *listened* to her. The operator not only heard a problem described, but recognized how important it was for this customer to determine why she could not complete this particular call. The second operator, like the first, could have let the matter drop, but didn't. She followed through, determined the phone was out of order and reported it to the appropriate people.

Getting away from the letters for a minute, far more of our customer contacts come by phone. And of course, a certain number are in person. Our Operations-Commercial group ran a check on some 200 business offices around the country recently to see how "reachable" the business office manager was to the customer.

Well, I'm happy to say that the calls placed were handled properly more than 80 per cent of the time. If the caller was not passed along, he was not only told why, but also informed when he could expect the manager to return the call. Although I'm happy that the majority of the calls did go through, I'm equally concerned about the 20 per cent that didn't, and I worry about why they didn't.

We've got to stop building walls around our managers. These are the people who have the authority to correct the things the customers are complaining about. In all my years in this business, I've always had my home telephone number published in the directory. I know this isn't generally true of executives in other industries, but I've always felt it was the right thing to do. Over the years, I've received my share of crank calls, but I've also gotten calls from people just seeking help with their phone service. I've always been more than happy to help solve their problems whenever I can.

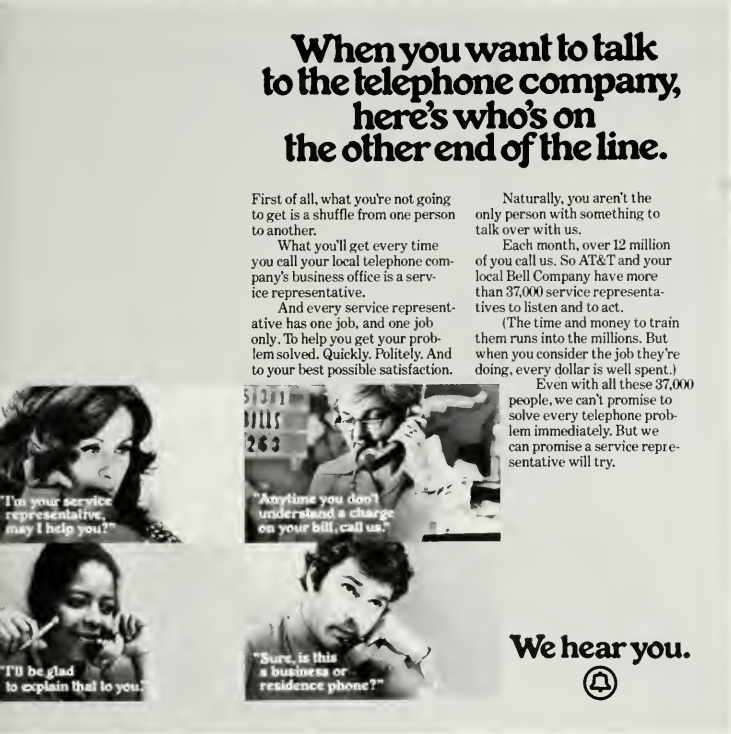
The Pacific Company, one time, made a study of some 150 written customer complaints. These complaints had been mailed either to company executives at Pacific, or directly to a public utility commissioner. In tracing the complaints back to see what kind of treatment the customer got along the way, the company discovered that more than half of the letter writers, 58 per cent, as I recall, had contact with only one employee before taking up their pens.

Like the 20 per cent of the calls that didn't get through to the managers in the Operations test, these letter writers didn't get the chance to have their problems reviewed by supervisors or managers at the local level. Well, you can bet that, following the written complaint, the customer got the attention from the people who should have given it to him the first time.

Again, don't misunderstand. I'm not suggesting that we capitulate to unreasonable demands, simply to curtail the number of complaints this company receives. We have rules and regulations to live by, and generally they must be observed. What does concern me, though, is that too often our employees hide behind the rule book and fail to honor some very sound requests simply because they are afraid to risk doing what they know is right, because it's not covered by the rules. In the final analysis, rules are there to guide us, not to govern us.

Take the case of the man in Brainerd, Minnesota, one of the very few places left in the country where equipment shortages still require 8-party service. As he was a year-round resident in an area primarily inhabited by summer vacationists, he asked if it wouldn't be possible to tie his line in with some of theirs. He reasoned that for most of the year, at least, when they were gone, his telephone wouldn't be ringing as often. You can't fault the logic. But do you know what our initial response was—absolutely not! You know why? If the other permanent residents found out, they'd want similar consideration. By the way, once he took the trouble to write me about his suggestion, we took another look at the rule book and found no reason why we shouldn't honor his request. He's a much happier man, today. And thinks a little better of us, too.

On the other hand, a Brooklyn customer, an elderly man, wrote


"I'm your service representative, may I help you?"
"Anytime you don't understand a charge on your bill, call us."
"I'll be glad to explain that to you."
"Sure, is this a business or residence phone?"

When you want to talk to the telephone company, here's who's on the other end of the line.

First of all, what you're not going to get is a shuffle from one person to another.

What you'll get every time you call your local telephone company's business office is a service representative.

And every service representative has one job, and one job only. To help you get your problem solved. Quickly. Politely. And to your best possible satisfaction.

Naturally, you aren't the only person with something to talk over with us.

Each month, over 12 million of you call us. So AT&T and your local Bell Company have more than 37,000 service representatives to listen and to act.

(The time and money to train them runs into the millions. But when you consider the job they're doing, every dollar is well spent.)

Even with all these 37,000 people, we can't promise to solve every telephone problem immediately. But we can promise a service representative will try.

We hear you.

Some years ago, Arthur Page, the first vice president of public relations at AT&T, put the matter sharply into focus: "Statements . . . made publicly are hostages for performance." Our current advertising program is just such a hostage.

telling how upset he was that his local bank had decided not to act as a collection agency for the company, and that he would now be forced to spend 70 cents in subway fares to come into the business office to pay his bill. While we couldn't force the bank to continue collecting his bill, as he suggested, we did ask the local business office manager to look into what could be done. Since the customer didn't believe in checking accounts, there was no safe way the manager could advise mailing in payments which would not incur costs almost as high as the subway fare to which the customer objected. In looking over the customer's payment record, the manager observed that over many years he always paid his bill promptly, and in full. In addition to providing this customer with the addresses of two other collection points nearer his home than the business office, the manager suggested, in light of the customer's fine credit record, that he remit payment every other month. Here's a manager willing to take a collection risk in an effort to do the right thing by this customer. And I find that very commendable indeed.

If we want to encourage employees to take such independent action in response to specific customer needs and requests, we, as managers, must set the climate. We'll never convince our customer contact-employees that we are sincerely interested in having them use their own good judgment in dealing with customers if we force a strict adherence to the rules and require double-checking of the most trivial matters up the line for higher level approval. While it is a manager's responsibility to see that his staff is adequately trained and can be relied upon to use common sense in dealing with customers, once that task is accomplished, managers should not keep intruding their presence. Following the careful selection, training and placement of the most competent employees in positions of trust and responsibility, nothing ruins initiative faster than to have managers who insist on second-guessing every decision and require that everything be run by the book. Again, we shouldn't throw the book away, but, I reiterate, the rules are there to guide us, not to govern us.

Over the past year, I've held more than 30 large, formal, employee meetings around the country and quite a number of smaller, informal, higher-level management meetings. At these meetings, I've stressed that I know of nothing more important to providing top-notch service than the *sense of proprietorship* each Bell System employee brings to his or her job.

Just recently, we embarked on a major national advertising campaign built around the simple phrase, "We Hear You." Through these three words we hope to convey to customers our determination to be responsive to their needs and concerns. Customer opinion, of course, will not be swayed one hair's breadth by any advertising campaign unless it is backed up by people who are ready and willing not only to listen, but to follow through with a satisfactory performance from the customer's point of view. When we say "We Hear You," it carries the promise that we will listen. Employees who have that sense of proprietorship will see to it that the promise is kept.

I remind you that where that sense of proprietorship has been lost, you and I have no more important responsibility than to restore it; and where it has not, no more important responsibility than to see that it is maintained.

When that's done, the customer will know that we're listening. ☐

Productivity Bargaining:

Invitation to Inflation

Like the road to hell, the pathway to inflation is beautifully paved with good intentions. Thus, perhaps we shouldn't be surprised to hear even important policy-makers — pressed to find some way to head-off or end a strike by granting an otherwise unjustifiably large wage increase to some key union—seize upon the notion that such an increase is noninflationary if only it is offset by an increase in that industry's output-per-manhour (naively called "productivity"). Unfortunately, this notion ignores both the basic economics of wage determination and the nature of productivity itself. Followed to its ultimate in the real world, raising wages within an industry in accordance with that industry's "productivity" would lead either to a completely senseless allocation of the nation's economic resources, or to accelerating inflation, or to both.

The reason for this lies in the difference between doing something within the economy as a whole and doing it within each individual industry. It is well known, of course, that for the total economy the gap between increases in compensation per manhour and increases in output-per-manhour does tend to be filled by increases in prices. This is illustrated by the top three bars of the chart on pages 8 and 9, which show that the relationship is nearly exact over the long pull. Clearly, then, a larger increase in output-per-manhour would permit a larger increase in compensation per manhour without aggravating the rate of inflation. This relationship, of course, was the basis for the Kennedy Administration's wage-price guidelines.

Given this relationship for the total economy, it is a relatively easy jump to the conclusion that wage

by Kenneth Militzer

increases in each industry should equal the rise in that industry's productivity. That, however, is a perilous jump to make.

The reason is illustrated in the chart's middle panel. Its top two bars show the change in output-per-manhour in two major industries—chemicals and fabricated metal products—for the 24 years ending in 1972. As can be seen, these two industries had widely different rates of increase in this measure of productivity. The lower six bars of the panel show the actual average hourly earnings in these two industries at the beginning of the period and at the end of it, as well as the earnings which would have prevailed if wages had been set only in accordance with changes in output-per-manhour beginning in 1948. As the panel graphically demonstrates, actual wages in these industries were quite similar in both years, whereas changes in output-per-manhour alone over these years would have suggested that wages in the chemical industry would have increased more than *four times* as fast as those in fabricating metal products by 1972, assuming productivity bargaining.

Would aggravate inflation

This indicates why productivity bargaining—if applied to individual industries—would lead to a serious misallocation of resources. Presumably, these two industries were bidding for workers of roughly comparable skill levels in these years, and were each obtaining the number which they needed to meet the demand for the industry's products. Setting wages by increases in output-per-manhour over this period, however, would result in workers rushing to the chemical industry and away from fabricated metals—probably (if the differentials were allowed to stand) to the point where there would be no more fabricated metals industry.

That solution, of course, would be entirely unacceptable. Therefore, instead of that, the fabricated metals industry would have to meet the wage rates in the chemicals industry. In order to do that, however, it would also have to raise its prices considerably. It is this tendency, repeated over the low-productivity industries throughout the economy, which would result in accelerating inflation if wage increases in industries with rapidly increasing productivity were granted in accordance with those increases.

Formula for stability

The economists in the Kennedy Administration clearly recognized this fallacy when they drew up their famous wage-price guidelines. These said that ". . . the rate of increase in wage rates (including fringe benefits) in *each industry* (should) be equal to the trend rate of *over*-all productivity increase. General acceptance of this guide would maintain stability of labor cost per unit of output for the economy as a whole – though not of course for individual industries." (Emphasis added.)

Moreover, those guidelines were not pulled out of thin air. They were soundly grounded in what actually happens in the real world. This can be seen from the chart's lower panel, which shows how increases in compensation per manhour in six industries compare with increases in productivity.

Three of these six industries experienced exceptionally rapid increases in output-per-manhour over this period, and three of them had slow increases. What stands out, however, is that the average rate of change in compensation is nearly identical for all six industries! This reflects the fact that each of these industries had to bid for workers in the same overall labor market, and each industry had to offer a competitive wage rate for the particular kind of skills which it was trying to attract just to stay in business.

What all of this demonstrates is that it makes no sense whatsoever for wages to be set according to increases in any particular industry's productivity, and this is true under virtually all circumstances.

On the other hand (lest it sound completely unjust), this is much different than saying that the wages of individual workers or groups of workers should not in any way reflect their productivity. After all, most everyone wants to be paid according to his own productivity, and it is obvious that when employers pay wages they do so to purchase productive work.

Market prices a factor

There are two reasons for this seeming paradox. One is that productivity measures deal in physical terms, not dollar terms. The other is that, while productivity in its purest sense is an absolute – the number of bushels of dirt shoveled per manhour, for example—this absolute measure cannot be compared in any absolute way with a similar absolute in other industries—for example, with the number of IBM cards key-punched per hour. These comparisons can only be made through the mechanism of market prices. Hence, productivity is reflected in wage rates only to the extent that it does cause wage rates in the labor market to change.

How this happens in actual practice can be seen both by the economic theory of wage determination and by a fairly simplified example. Let's take a quick look at the wage theory first.

Classical economics says that employers will hire workers as long as the marginal product which the last worker produces equals or exceeds the employer's marginal cost in hiring that worker. Like a lot of things in economics, that sounds rather complicated, but isn't. All that it means is that, if it costs $3.00 to hire a worker and he can produce $3.50 worth of *net* revenue, you will go ahead and hire him. On the other hand, if it costs $3.00 to hire him and the *net* value of his output is only $2.50, you will not hire him. The only thing which makes it a bit complicated is that here we are not dealing with total output divided by the total number of employees. Rather, we are trying to measure the additional increment of output which one additional worker could add to the value of a firm's output in the marketplace.

This, of course, makes it a little difficult to translate that wage theory into twentieth-century, corporate America. It wouldn't be revealing any trade secrets to assert that corporate cost accounting is not so precise as to even approximately determine the marginal product to a firm of adding just one more employee – even though the marginal *cost* of doing so is known quite precisely. Just how the theory and practice do come together in the real world–and just how productivity does and does not get involved in setting wage rates–can be demonstrated with an example.

Supply and demand

Let's assume that there is a Town Alpha whose citizens have varying degrees of need for dental services and varying abilities to pay for them. Let's further assume that all dentists are equally productive, being able to fill two standard cavities per hour. If, for some reason, there were only one dentist in Town Alpha, people wanting dental service would bid the cost of filling cavities way up, perhaps to as much as $100 per cavity. At that price, this one dentist would treat only the very wealthy (or perhaps the very desperate), but the marginal value of his service would be very high. At the other extreme, if there were lots of dentists in Town Alpha, all of whom wanted to work, the dentists would bid the cost of their service down to perhaps only $1.00 per cavity. Under these conditions, however, the marginal value of their service–that is, the value of taking care of the last cavity filled –would be rather low, because at those prices presumably everyone would have every little cavity taken care of, and there wouldn't be anything significant left to do.

On the other hand, if dentists were paid only $1.00 per cavity, there might be only one, dedicated, and probably vastly under-skilled, soul who would do any dental work. Conversely, at $100 per cavity, several hundred dentists might be willing to set up shop in Town Alpha. What really happens, of course, is that the demand for dental services tends to bid the price up, while the supply of dentists providing those services tends to bid the price down, until some sort of an equilibrium is reached, say at $10.00 per cavity. But all of the various combinations of supply and demand that are possible, and all of the prices which they might yield, are consistent with the assumption that the rate of productivity is always two cavities per dentist per hour.

Now, let's assume that someone invents a new high-speed drill which doubles the productivity of dentists, so that they can fill four standard cavities per hour. For the sake of simplification, let's also make the economists' standard assumption that all other things remain equal, including the cost of training dentists to use the new drill and the cost of the drill itself (that is, that the new drill costs no more than the old one).

Under these circumstances, there would immediately be a doubling of the supply of standard cavity fixing in Town Alpha. The price of fixing a cavity under those con-

WAGES, PRODUCTIVITY, PRICES
Average annual increase 1948–1972

Compensation Per Manhour
Output Per Manhour
Consumer Price Index

OUTPUT PER MANHOUR
Average annual increase

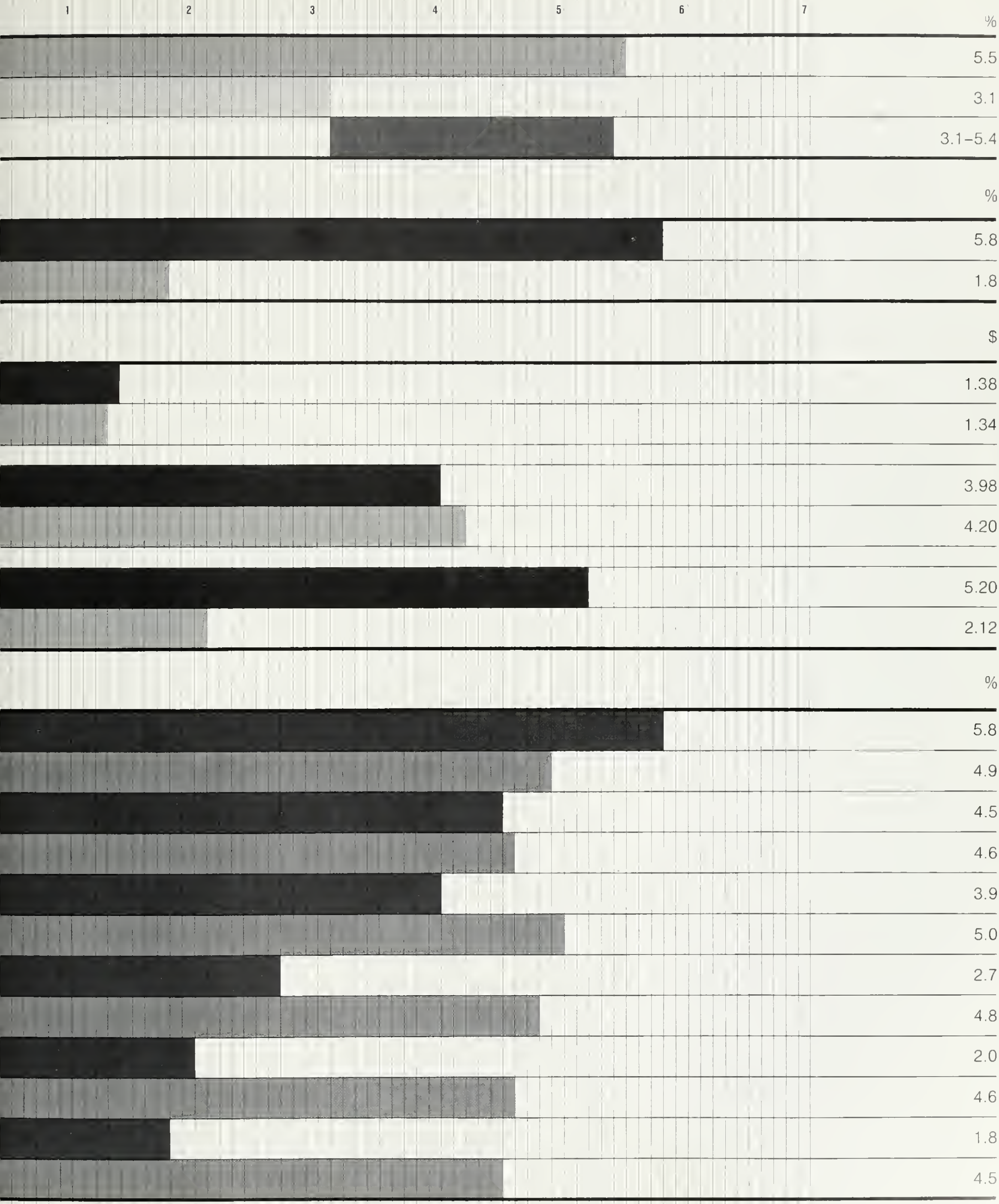
Chemicals
Fabricated Metal Products

AVERAGE HOURLY EARNINGS
Average annual increase

1948	Chemicals
	Fabricated Metal Products
1972	Chemicals
	Fabricated Metal Products
1972—If set according to productivity	

PRODUCTIVITY VS. COMPENSATION
Average annual increase 1948–1972

Chemicals	Output Per Manhour
	Compensation Per Manh
Petroleum	
Coal Mining	
Primary Metal Products	
Machinery	
Fabricated Metal Products	


1
2
3
4
5
6
7
%
5.5
3.1
3.1–5.4
%
5.8
1.8
$
1.38
1.34
3.98
4.20
5.20
2.12
%
5.8
4.9
4.5
4.6
3.9
5.0
2.7
4.8
2.0
4.6
1.8
4.5

ditions would be bid down by dentists, even though they presumably would want to maintain or increase their same overall rates of income. Just where the new equilibrium price for dental services would actually be reached, however, would depend upon the slopes of the supply and demand curves—what economists call the elasticity of supply and demand. There might actually be fewer dentists eventually—that is, not a complete doubling of capacity. If this happened, however, there might also be a somewhat lower rate of total income for dentists, since now that fewer dentists were needed, not quite so much would have to be paid to get them. In this example, then, increased productivity brings both a decline in prices and a slightly lower rate of overall income for dentists. However, in this example, the wage rates for dentists would continue to equal the marginal value of their productivity.

Seems crazy, doesn't it, since we all know that the *real* productivity of dentists went up. The crucial difference, of course, is that we have been mixing apples and oranges. When we have been talking about productivity, we have been talking in terms of a *physical rate of output*. When we have been talking about marginal productivity and wage rates, we have been talking in *dollar terms*—in terms of price levels set in the marketplace. And, if you think about it, we all know what happens in the marketplace. Major breakthroughs in productivity bring cheaper goods, not a highly paid class of elite workers. (That is, they do when marketplaces are free to operate.)

However, this still doesn't show how productivity *does* enter into wage determination in such a way as to give the highest rewards to the most productive workers. This does tend to happen, of course, and two things cause it to happen. One is that employers will bid more for more highly productive workers, because their marginal product will be higher. At the same time, the skill levels involved in making a worker more highly productive tend to require training and inate abilities that are hard to acquire. Therefore, the supply of those workers tends to be more limited.

The important thing to note here is that there is just no way to compare the absolute productivity of different types of workers (e.g., the physical output of a dentist with, say, the physical output of a clerical worker). Therefore, wage judgments are reached in the market place and are based on the relative supply and demand for different types of workers. Since dentists tend to require a great deal more training than clerical workers, they are in shorter supply relative to their demand. Hence, the marketplace in twentieth century America has reached the conclusion that the value of the marginal product of dentists is greater than the value of the marginal product of clerical workers, and has set their pay scales accordingly.

Marketplace fluctuations

The marketplace, of course, can change these judgments, sometimes rather quickly and rather drastically, but always—if it is free to operate—the judgments will be based ultimately on considerations of supply and demand. If that sounds a bit unconvincing, think back with me to the summer of 1970 and consider the situation of aeronautical engineers. My recollection is that the demand dropped completely out of that market, while the supply was unchanged. As a result, aeronautical engineers previously earning salaries in the $20,000 a year category in 1968 began driving taxi cabs for closer to $6,000 a year, once their unemployment compensation ran out. The crucial thing about this example in terms of this discussion, of course, is that the productivity of those aeronautical engineers in any physical sense of the word is not what had changed between 1968 and 1970. Rather, it was the marketplace's assessment of the value of their marginal output. In 1968 this was deemed to be very high. In 1970 it was judged to be next to nothing. (It's true, of course, that engineers who kept their jobs did not experience similar cuts in pay, and some of them may even have gotten cost of living increases. This, however, is due to the lack of mobility and responsiveness in labor markets, rather than to any basic defect in the theory.)

Thus, productivity is reflected in wage rates to some extent, but only in dollar terms in the marketplace, and not in terms of the change in any particular industry's average productivity or output-per-manhour. Using the latter to set wage rates would cause individual wage rates within the economy to get far out of line with each other. Using the former keeps all wage rates reasonably in line with the supply and demand for particular skills, and normally rewards more highly skilled and highly productive workers with higher wage rates. Although that's an over-simplified statement of a rather theoretical concept, the distinction between these two different ways of looking at productivity is an important one.

Moreover, in the last analysis, it is this distinction that leads to the overall conclusion that wages ought to go up in line with increases in productivity for the economy as a whole. The next best alternative to that would be for wages to remain stable and for prices to go down as productivity went up. That's not a bad idea either, but that would spread the benefit of the increase in productivity among all consumers, giving a windfall gain in purchasing power to savings which were earned in an earlier period when productivity was less. That is, it would give savers command over more goods than they actually earned through their contributions to production. On the other hand, giving the benefit of increases in productivity to labor—and to capital as well—restricts it to the persons who are currently participating in the economy, which seems to make good sense both politically and economically.

Pay Board exceptions

The Pay Board, of course, also recognized this when it set its wage standard. That is, it got to its 5½ per cent standard by allowing 3 per cent for the long-term average increase in output-per-manhour in the economy as a whole and 2½ per cent for the Administration's interim goal on the cost-of-living.

Unfortunately, the Pay Board departed somewhat from sound economics when it went on from there. It allowed four exceptions to this wage standard–for tandem relationships, for catch-up, for essential employees, and for productivity. The first two are hard to argue with, but were becoming less and less important over time. The third was never used.

However, in allowing an industry to give an extra large wage increase if its workers would agree to increase their productivity, the Pay Board departed from sound economics. At least some members of the Pay Board recognized this, but apparently the Board felt that it could ignore economic considerations for a short period of time without building up any undue distortion.

Even in the short run, however, this standard has a basic flaw. That is, it "rewards the bad guys." For example, workers who have restrictive work practices can, under this standard, trade them for over-guideline wage increases. The problem, of course, is that they never should have been allowed to establish those kinds of work practices to start with. The poor workers who have been doing the right thing all along don't have that kind of a hostage to trade for ransom, so their good behavior is rewarded, ironically enough, by their falling behind in the wage race.

Dangerous bargaining

Moreover, no industry operates in a vacuum. Hence, whatever is done for one group–however logical or necessary it might seem–is likely to affect the demands from other groups as well. For example, last year's strike on the Long Island Rail Road occurred largely because the Long Island's trainmen got an above-guideline increase approved by the Pay Board earlier on the justification that it was coupled with an agreement to end feather-bedding. The line's shopcraft and clerical employees then asked for equal treatment–even though they didn't have any feather-bedding practices to trade for it. This tendency for wage rates in all areas of the economy to move together makes wage bargaining based on the productivity of any one group or industry illogical and dangerous.

Even this logic, however, is unlikely to overcome the emotional appeal of the idea that labor in each industry must somehow be rewarded for any increases in output-per-manhour. Perhaps that emotional appeal will give way, however, to an understanding of the sources of productivity growth and the extent to which labor is actually responsible for them. The major sources of productivity growth include:

- Technological change
- Increased capital intensity
- Improved operating methods and work practices
- Economies of scale
- Advances in knowledge
- Shifting work to customers
- Better education and training
- Employees working harder

Sources of productivity

What stands out, of course, is that the bulk of the increases in productivity stem from sources which have little or nothing to do with the direct contributions of labor itself. For example, if 100 men moving a mound of dirt with hand shovels are replaced by one worker using a power shovel, the output-per-manhour will go up tremendously. The source of the increase, however, is not in the employee working harder. Rather, the operator of the power shovel is probably not working as hard as the typical worker with a hand shovel. The source of the gain in productivity came from (1) the advance in knowledge which permitted the power shovel to be invented; (2) from technological change, in the invention of the power shovel itself; (3) from an increase in capital intensity, since a great deal more capital is embodied in the power shovel than was embodied in the hand shovels; and (4) in the better education and training which permitted a worker who was previously operating a hand shovel to now operate a power shovel. It is only the last of these four which might warrant any increased payment to the worker in his own right, and obviously even that one does not warrant an increase in his wage rate which at all matches the increase in his output-per-manhour.

Taking another example, an important source of increased productivity in many industries in recent years has involved a shift of work from a firm's employees to its customers. Two outstanding examples of this are the trend toward self-service in retail stores and the switch to customer-dialing of telephone calls. However, it would be hard to sell the American public on the idea that retail clerks should earn more because retail customers now collect their own goods from the shelves rather than having it done for them, or that telephone operators should be paid more because customers are dialing their own telephone calls.

Thus, wages should be tied to increases in the productivity of a particular industry only when those increases are achieved through increases in labor's own skill or efforts. To argue that productivity increases are taken out of the sweat of the employee's brow, however, is to argue that many workers in the nation–in such industries as the airlines, coal mining, railroads, chemicals, etc.–are working at least four times as hard as their predecessors worked 20 years ago, because that's about how much the output-per-manhour in those industries has increased.

Resist illogical demands

All of this, of course, describes what should happen if labor markets operated under conditions of pure competition–which is not exactly the situation in present-day America. Just because labor markets are largely institutionalized, however, labor unions should not be permitted to force un-economic and illogical and inflationary wage decisions under the guise that they are somehow justifiable because a particular industry's output-per-manhour went up faster than the average. Instead, such a tendency should be resisted with every means available–and perhaps an understanding of the basic fallacy of productivity bargaining is the first and most important of those means.

Mr. Militzer is Director-Economic Analysis for AT&T.

What Has Western Electric Done for Us Lately?

by John McFee Brown

Not too many years ago — certainly well within the memory of anyone who can recall all the neighbors gathering for a televison party — Western Electric was unquestioned as the outstanding supplier of communications equipment. We built telephone sets and switchboards that everybody knew to be high in performance and low in cost. Our reputation in telephone equipment manufacture stood out like a grain elevator in a Kansas wheat field.

Communications, today, is more complex technologically than the telephone business was in the days of one TV set in a neighborhood. Telephone companies require more efficient, more sophisticated, more diverse means of satisfying the ever more complex communications needs of the American public. At the same time, fundamental changes in the structure of the industry have set off a frantic scramble both here and abroad to grab off pieces of the specialized communications and "interconnect" markets which were opened a few years back with regulatory sanction.

What is Western Electric doing for its telephone company customers in this new environment? That is the crux of the problem, not what we did ten years ago, but what we're doing now and what we expect to do in the future.

In supplying the increasingly complicated requirements of the Bell Telephone companies, our philosophy hasn't changed. We still do our best to provide what is needed, when it is needed and at reasonable prices. But some of our methods are new and they may mean a difference to the future of the Bell System.

Among them is a new approach that compresses and streamlines the engineering needed to add new capacity or provide new services to the Bell System network. A $50-billion network can't be rebuilt for every new idea that comes along. The new has to work compatibly with the existing parts, and that takes a lot of engineering.

The Branch Lab concept which brought Bell Labs people physically to WE locations a decade or so ago has been a tremendous help in smoothing the transition from Labs invention to mass-produced product. With Bell Laboratories and Western Electric engineers working side-by-side instead of in series, many production engineering headaches have been avoided, product costs have been reduced and time schedules have been shortened. As a result, the Bell System has been able to respond more effectively to the opportunities provided by new technology. Western's use of the laser in cutting brittle materials, in measuring and in testing is one example.

One successful application of the design lab concept is in the manufacture of PBXs at Denver, where Western, Bell Labs and AT&T specialists in equipment to be used in customer premises are now concentrated in a new plant. Standard PBX systems are available for immediate shipment, while entirely new concepts can grow from a gleam in a designer's eye to a finished product ready to be installed on a customer's premises in less than a year's time.

Source Document Engineering (SDE) is another way the engineering interval has been reduced. It's now widely used on broadband jobs for Long Lines, but there are also many variations of SDE used on central office installations. SDE eliminates one of the most time-consuming steps in the whole Bell System engineering process. It bypasses the outline spec—one of the documents that was traditionally prepared by the telephone company engineering staff for Western's use in doing the detailed engineering jobs. The outline spec often had to be revised because of changes in plans which the companies wished to incorporate.

With the regionalization of West-

ern's Systems Equipment Engineering groups in the mid 60s, we brought engineering forces in the Bell System closer together physically. With SDE, we're taking another step in the same direction. Telephone engineers now initiate a project by providing such source documents as facility charts, traffic orders or circuit requirements and Western engineers at the regional center then draw up the spec using all available details. They have the latest technological data as well as the latest traffic studies all in one place. As a result, weeks of engineering time can be eliminated. The telephone company engineer who was normally tied up on such a job for months can now devote his full time to determining needs and checking to see that the specifications will do what is expected and that the price is reasonable.

Another major development in the regionalization of Western's service operation is known as the Material Management Center (MMC) concept. The first of these new facilities is expected to begin operations before the end of the year. Eventually, there will be an MMC in each of the service regions.

These MMCs are being built to improve service to the operating companies. An MMC is a sort of super distribution center that will furnish Western's service centers and installation sites in a given region with the material to meet the telephone company's needs. It is the keystone to a fully integrated regional inventory management system. When the system gets rolling, it is anticipated that each MMC will stock about 45,000 different items and ship about 300,000 pounds of materials each day. The items stocked would include products of WE manufacture as well as items purchased from outside suppliers.

The new concept requires the investment of many millions of dollars in new facilities, but it offers potentially even larger savings in inventories now being maintained in a number of locations, in transportation costs and in shorter intervals which, again, means improved service.

Another way that Western has been able to cut intervals on major jobs is by wiring and testing components to a greater extent in the factory, so that less installation time is needed at the site.

Our engineers talk of "modularized," "connectorized," "unitized" bays. What they mean is that many

sub-units in an extremely complex system can be standardized so that more of the wiring and testing traditionally done at the site to meet the specific needs of the community can be done during manufacture. When the modular sub-unit arrives in the field, it has to be plugged in and there may be a few local connections, but the bulk of the internal wiring has been prefabricated. As much as three months have been saved on some No. 5 Crossbar jobs. With the new 5A Crossbar, which is pre-assembled and tested on platforms at the factory and trucked to the site as virtually complete units, the cost savings and interval reductions are even greater. Another major system using this concept is No. 2 ESS where complete offices are manufactured, tested and shipped in trailers.

Universal test gear

Another potentially big time and money saver for the telephone companies is "universal" test equipment for the repair centers. A great deal of development effort has been going into this at Western service locations and at our Engineering Research Center near Princeton. There is a need for fast, reliable equipment for all sorts of testing and for diagnosing problems. Specialized test gear for every product we make could get very expensive, so we're working on as modular—and universal—a basis as possible to come up with one piece of equipment to test practically everything that comes in for repair.

Also in the area of trying to reduce intervals, a number of different ideas on how to computerize more of the engineering effort that goes into a central office are being tried in various parts of the country. As ideas are proved in, they are spread and adapted nationwide.

One idea with a great deal of promise is EASE (ESS Aids For Systems Engineering). EASE uses operations research techniques to assist engineers in problem solving and eliminates much of the manual input that goes into engineering an electronic central office. There are a number of separate programs for checking such things as floor-plan arrangements and arrangements of various kinds of cabling that can cut engineering time in such areas in half.

Computers have been a tremendous help in recent years in taking a lot of the "dog work" out of engineering. They've made it possible to free people all along the line to work in the decision and creative areas. Sizable amounts of money have been saved for the Bell System. The use of specification forms, which are largely computerized, resulted in savings of $2.5 million, mostly in engineering time at the regional centers during 1972, and just for transmission products.

Savings on plug-ins

Another area of large potential savings that is being developed jointly by Western and the telephone companies is the inventory of plug-in units held as spares. There are inventories of these units at thousands of locations to assure almost instantaneous replacement since a unit that fails in service must be replaced immediately. Great effort is now going into gathering these spares at a location in each operating company's territory where they can be tested and checked to assure that the appropriate codes are being stocked, and where they can be available the day they are requested, thus reducing the number of spares in each central office. Overall, the inventory of plug-in units has been reduced substantially, with greater assurance that the spares are in perfect working order.

Forecasting cable needs

Cable is another inventory problem getting attention at Western—actually not one inventory problem but several. To begin with, it's not as simple as it sounds to get cable of the right size and length to the right spot precisely when it's needed—without a lot of expensive extra capacity. Cable comes in a tremendous range of pairs, from a few dozen to 2,700.

When you run cable in a central office, you generally want sufficient capacity to take care of reasonable growth but space is limited. You want to avoid congestion and make optimum use of cable you already have. "Cable Codes" is the name of this project in forecasting, and it will doubtless generate considerable interest as time goes on.

Rush orders are another aspect. To take care of emergencies, local telephone people generally have special caches of cable left over from previous cable runs. Every WE service center usually stores cable in a variety of sizes to take care of anticipated needs and emergencies. Cable plants also have stocks of standard sizes. But what if you need a nonstandard size in a hurry? Computers are now being fed data on what's available in inventory in each WE location; and in almost no time, just what you need can be tracked down without making a special run at the factory.

Inventorying all the bits and pieces is a big job, but in the long run it will tend to reduce the Bell System's stockpiles of cable and the money tied up in them. It will also give the factories a better idea of what sizes and lengths of cable to manufacture in the first place. And it may take a lot of lead time out of cable ordering.

Broadening repair work

One of the biggest changes in the past 10 to 15 years has been a shift in telephone company equipment repair needs. It used to be that WE service centers worked primarily on station equipment. Gradually, they've been asked to take on more and more repairs of what is essentially central office gear. Not only is the variety of products greater but the products themselves are much more sophisticated.

Repairing plug-in electronic units for an electronic switching system, for example, requires a lot of expensive equipment and a lot of in-depth training on the part of the people doing the work. Since the volume of work is not sufficient in any one area to invest in the specialized equipment and trained manpower, Western has designated certain centers to handle certain products.

Plug-ins for T1 carrier, for example, are currently repaired at three WE service centers. Last year, the New Jersey, Illinois and Southern California service centers repaired some 150,000 of the more than four million units now in use.

Some new forms have been developed to expedite turnaround time. One form handles all the details of taking the item out of service, turning it over to Western for repair, getting it to and from the right place, and getting all of the billing and accounting data to the right people.

Computer helps training

Even though communications is our business, the rapid pace of technological change presents continuous problems in getting up-to-the-minute technical information to everybody in need of it. New information is continually being generated at different locations in Bell Labs and in Western, and it is being used continuously by thousands of installers and telephone company engineers and craftsmen all over the country. How can everybody be kept up to date, particularly on complex new technologies like electronic switching?

Special schools are one answer. Since July 1970, more than 1,800 telephone company craftsmen have received hands-on training at the ESS school that Western runs for the Bell System in Columbus, Ohio. About 1,200 more craftsmen are scheduled for training in 1973, in addition to local courses in the companies for which Western supplies the instructors.

Clearing houses for technical information on all aspects of a product from initial design through repair are another answer to the information dispersal problems. Serving as these centralized clearing houses are our Product Engineering Control Centers (PECC) and we have them for all major product groupings.

We also send knowledgeable people out to the companies to assist in face-to-face meetings on what's new, what's available and what's on the drawing board, and to help us find out what the operating companies need that we do not yet have available. This effort is spearheaded by a new group called "service consultants".

In the last year, this group had about 17,000 personal contacts in the operating companies. About a quarter of these contacts were in the nature of trouble shooting or answering technical questions. Another 35 per cent dealt with time intervals and equipment availability. Most of the rest were informational, to provide what telephone company engineers and marketing people needed to know to avoid misunderstandings about features and costs. This group of service consultants is backed up by the full technical resources of Western's Product Engineering control centers. A major responsibility of the service consultant is to make sure he gets the right man from the factory out into the field to provide maximum help to the operating company. The program started a year ago with customer premises equipment, but it has now been extended to all our major product areas.

Seeing companies' needs

The major objective of service consulting is to make sure all operating company personnel have complete information on the merits of Western products, and Western has full information on operating company needs which are not being met with existing products or services. Particularly important is identifying unfulfilled needs of telephone companies early enough to prevent any impact on the operating companies' service performance.

Probably the biggest accomplishment of Western Electric as far as the Bell System is concerned is what we have done in the way of reducing our costs to combat inflation. Western's formal engineering cost reduction program has been highly successful. It produced first-year gross savings of about $97-million in 1972. This was an all-time record for the program, which has provided hundreds of millions of dollars in cumulative savings for the Bell System.

The unusual aspect of this program is that the savings reported derive from products already in production. Before the product was allowed to go into production, every effort was made to get its cost down. After the product is in production, it is frequently reappraised by cost reduction engineers to see if new technology, new materials or revised manufacturing layouts can shave a penny off this operation or a cent and a half off that one. Individually, some of the savings may not be of tremendous magnitude but in the aggregate they add up to substantial amounts of money.

The goal: second to none

Improvements in plastics material have been a big saver for the Bell System in recent years. Molded plastics have replaced many castings and complex metal parts throughout the network, at a considerable saving. Printed circuits and potted plastic modules have not only reduced costs but increased reliability and minimized damage in shipment. Miniaturization of parts made possible by advances in semi-conductor materials have not only saved space in telephone central offices but also improved reliability and reduced costs.

The war on costs in Western is not exclusively an engineering function, it is the responsibility of our 200,000 employees. During 1972, every facet of the business was carefully reviewed as to its direct contribution to a product or service, and every effort was made to cut costs wherever it was safe or prudent to do so. It is from such efforts that productivity gains are made.

Western's productivity is going to be an increasingly important factor as competition in the communications business intensifies.

As WE spokesmen have said on many occasions, our telephone company customers are not obligated to buy from us. They will buy from others when they can get a better price, better service, or better products. As the integrated supplier of the Bell System, Western Electric should be able to do better than outsiders with respect to the items and services we furnish. Our job is to see that the advantages and benefits we have traditionally offered the telephone companies continue in the changing environment in which we all operate.

Mr. Brown is Vice President-Customer Planning for Western Electric.

Mobile Is Moving

High Capacity Mobile Telecommunications thrusts the Bell System forward toward its goal of providing service anytime, anywhere.

A "giant step into the future" is a phrase used to describe every new commercial development from lipstick shades to frozen coffee. It softens the impact, accordingly, to say that high capacity mobile communications is, in fact, a giant step into the future.

Then why use it?

Because the phrase affords an expansive but reasonably accurate impression of the impact likely to be felt nationwide by the implementation of "High Capacity"—the shortened name it has come to be known by.

With the High Capacity System in operation—and its basic planning has already been outlined to the FCC—the average citizen could have mobile telephone service virtually at his fingertips wherever he may be.

And the service will be good. It won't be a crowded, interference-rife, catch-as-catch-can roulette game that the mobile user has grown used to.

The FCC has allocated 115 megahertz (MH$_z$) for mobile radio which is to be apportioned between private systems and common carrier systems. That portion allotted to common carriers, which is subject to FCC confirmation, by itself will permit a large increase in usage. The potential availability of a large block of channels has enabled Bell Laboratories to design a new type of mobile system which can serve many times more people per channel than is possible today.

The practical effect of this plan permits a dramatic increase in the number of people who may avail themselves of good mobile communications service—from reliable, comparatively inexpensive motor vehicle phones, to portable sets that can be carried in a handbag or back pocket. A separate system using similar design concepts would permit mobile service from airplanes, a convenience traveling business people would probably applaud.

Mobile for millions

All in all, the number of people who could have the convenience of mobile service from their telephone company would jump from the 40,000 users today into the millions in a few years. And the service would be fast, accurate, reliable, and inexpensive by comparison with prices necessitated under present systems.

Truly a giant step into the future.

What makes the phrase ring even truer in this instance is the fact that the system is ready to go from the planning stage to the building stage within a few years after it receives approval. Coupled with the dynamic switching capabilities of ESS, High Capacity promises to fulfill the decades-old Bell System goal of putting a telephone within everyone's reach anytime, anywhere.

This is how it would work:

The system would be able to serve millions of mobile telephone and dispatch service customers nationwide through the use of a honeycomb pattern of small service areas that allows reuse of each radio channel many times in the same city. The system would provide automatic dial mobile telephone service to individual customers, and various communications services for private fleets of vehicles and their dispatchers.

In addition, the proposal would permit in the future a new air-ground communications system for placing telephone calls to and from private and commercial aircraft.

Simple concept; vast potential

The AT&T system represents a radical departure from current mobile radio concepts and practices. It can offer high-quality services over a wide range of system sizes—from small cities and towns serving several hundred to large cities serving hundreds of thousands of customers.

Key characteristics of the AT&T system include:

- A honeycomb pattern of small service areas, or "cells," which allow radio frequency channels to be reused many times—10, 20 or even 50 times—in a single city.
- Landline transmission facilities that tie the individual cells into a single network.
- A sophisticated processor that controls and switches the entire network in an efficient and coordinated manner.

Mobile systems would first be installed in large cities and those adjoining areas where substantial exchange of calls would be expected; then, if demand warranted, they would be extended along major highways and rail routes and into smaller cities and towns. Ultimately, separate systems could be merged into continuous regional coverage.

The AT&T system divides service areas into an array of small, six-sided cells from one mile to a few miles in radius. Each cell would be assigned a limited number of channels—up to about 150—to serve those customers who are within its boundaries. Since the customer will move during a call, the mobile unit may have to be assigned a new channel and served through a new base station. This tuning and switching would take place so quickly as to be unnoticed by the customer.

A start-up system would use a limited number of relatively large cells—about four miles in radius—for economic reasons. Establishing the base stations necessary for 1-mile cells to serve a relatively few customers would push the costs per user to prohibitive levels. As customers are added, it becomes economical to cover more area, and to use smaller cells when necessary to serve more customers.

Automatic sensors would constantly check the cells for channel overload to determine the optimum time to add channels to each cell to meet additional demand. At some point, of course, all the channels would have been used, and it would be necessary to begin subdividing the cells to increase channel reuse. As the system continued to grow, more cells would be subdivided. In fullest development, the system would appear schematically to consist of a cluster of small cells—covering the central city—connected with arrays of larger cells providing regional coverage and extending along major highways and rail lines into other metropolitan and adjoining areas.

This type of incremental growth, with new base stations and radios added as new customers are added, achieves a cost per user that remains virtually constant from a few thousand customers to the limits of system growth.

Tying together the network of base stations is a complex function that can be performed only through the use of a sophisticated machine capable of processing large amounts of data and of switching telephone conversations as vehicles pass through cells.

Uses ESS flexibility

In AT&T's proposed system, this function would be performed by electronic switching machines. A slightly modified ESS unit—called a mobile switching office—would locate the vehicle, select the proper frequency to complete the call and, without interrupting the conversation, smoothly "hand off" the vehicle from one cell to the next.

With ESS, the AT&T system could offer a full range of communications services to individual customers as well as to fleets of cars or trucks. For example, a dispatcher would be able to call one unit in his fleet, two or three vehicles, or the entire fleet. He could do this by dialing a couple of digits or perhaps by pushing a single button on his telephone or Call Director®. If he wished, he could also allow his vehicles to complete calls over the regular message telephone network when the dispatcher's office is closed. In effect, AT&T's system would meet the needs of fleet managers for communications services and arrangements that have never before been available.

Attractive features

The proposed land mobile system would offer the public significant advantages of quality, cost and spectrum efficiency. For example:

Spectrum efficiency—A major feature of the new system is the concept of channel reuse. The system would provide as many as 25-50 simultaneous conversations in the same urban area on a single radio frequency channel.

Quality of service—The system would be designed to complete 98 per cent of all mobile calls during the peak hour. Dispatch calls would be held in an orderly queue and automatically completed within a few seconds. In addition, each system would provide broad geographical coverage on an economical basis, and vehicles could transmit and receive messages in other cities easily.

Moreover, all the "custom-calling" services available to business and residence customers served by electronic central offices also would be offered to users of mobile service—call transfer, and call waiting, for example, as well as abbreviated dialing and ring transfer. Customers who wished to transmit or receive data in either analog or digital form could attach appropriate data modems to the radio telephone units in their cars or trucks.

Cost of service—At this point, it appears that high-quality service would be available at reasonable cost to millions of customers; significant savings would result from combining single party telephone service and fleet communication services in the same system.

Public mobility, the need for constant communications and an increasing orientation of the American public toward service-rated industries will continue to add to demands for mobile communications. The number of households with at least one car (80 per cent), the number with at least one telephone (90 per cent) and the percentage of the labor force engaged in service-related industries (60 per cent) offer a large and natural market for the development of mobile communication services.

Huge demand foreseen

Our rough estimates for 27 major urban areas with a combined population of 71 million persons indicate that by the year 2000 the combined market in these cities would range from a low of 2.5 million users to a high of seven million. While these estimates were limited to 27 cities, the proposed system would be installed in many other areas throughout the country; on this basis the total nationwide market could be much larger.

The cost of the mobile radiotelephone—the unit installed in the vehicle—should help make mobile telecommunications service extremely attractive to the general public. To determine feasibility and cost, Bell Laboratories engineers, using modern but already available technology, have developed a prototype radiotelephone set that can handle 800 separate channels. Although we do not intend to design or manufacture mobile radiotelephone units for this service, Bell Laboratories specialists in the field speculate that existing equipment manufacturers probably could reduce the unit cost of mass-produced radiotelephone sets to a price well below the $950 now estimated. It is quite possible, then, that people purchasing new cars would regard a radiotelephone set as a desirable and important accessory.

New service dimension

As proposed to the FCC, the Bell System would perform these basic roles in implementing the system: design the system, including a compatibility specification for the mobile unit; provide the control and switching equipment as well as base station transmitters and landline facilities; and administer the continued growth and improvement of the service.

AT&T foresees a five-year-developmental program leading to the first land mobile service offering with a customer trial during the fourth year. This would be contingent, of course, upon final confirmation of the allocation of the necessary spectrum for wireline common carrier use and FCC approval of the system we have proposed.

The business and personal services the Bell System would offer in mobile communications all have their parallels in our existing terrestrial network; the high-capacity mobile telecommunications systems we have proposed would give these services a new dimension. Eventually, we expect that customers would come to regard mobile communications not as a "special" service, or even a radio service, but simply as a telephone in their cars or pockets. This can be achieved with the common carrier allocation now proposed by the FCC, if it is used in a system designed for smooth and virtually open-ended growth. □

An interview with
AT&T's Assistant Treasurer
Bill Burns who discusses
investment of the
Bell System's $10 billion
pension fund.

Managing the Money Managers

Sixty years ago this company committed itself to a pension program. Initially, pensions were paid out of current earnings, which meant, of course, that the demand on earnings could vary widely with the number of people who retired. Thus it was decided in 1927 to prefund—or set aside—money each year anticipating retirements.

Prefunding accomplishes two things: it stabilizes the impact on earnings; and it assures that money will be available to meet future pension demands. The efficacy of this step is clearly demonstrated by the demise of corporations whose retired personnel—and those ready for retirement – lost pension benefits because their pension plan had not been adequately prefunded. Those corporations went along paying pensions out of current earnings.

The establishment of an irrevocable pension trust fund at AT&T created a pool of money which, deployed in secure investments, could underwrite the cost of pensions.

Since 1927 the strategy behind the management of our pension funds has evolved from one of "protect the principal"—which translated

into acquiring only government obligations or the highest rated corporate securities—to one, in recent years, of maximizing total return through prudent investments, particularly in common stocks. The utilization of common stocks was started in the late 1950s to provide a greater total return than the more conservative forms of investment, and consequently better protection against inflation for the funds.

But capturing that extra return involves a concomitant element of risk. The job of minimizing risk and maximizing return is the responsibility of professional investors, or money managers, on whom Bell System companies rely to invest pension fund money. In each Bell company an officer is delegated the responsibility through his board of directors to manage the money managers—in short, to make sure that professional investors are maximizing return but doing so prudently.

At AT&T managing the money managers as a day-to-day responsibility is the job of William G. Burns, Assistant Treasurer.

Burns is a man immersed in the intricate, often esoteric operation of the financial world. He spends much of his time discussing financial information with securities analysts, economists, bankers, investors and others who have a like predilection for the energetic, dynamic, vigorously competitive operation known as the financial marketplace.

How he performs his job makes an interesting story in itself about one facet of this most basic American institution. But, it may offer, as well, some observations that anyone in a managerial capacity might find akin to his or her own function: namely, getting people to operate at

their most productive and satisfying levels.

And so, here then, is an interview with Bill Burns.

Q. You have a pool of money and you want it invested. Where do you begin? That is, how do you go about choosing one money manager over another?

A. The System has a large pool of money to manage (about $10 billion). So the managers are at our door constantly. We have a field to select from. We narrow this field to those who have shown good performance. Then we dig behind the track record; try to get to know those money managers who appear capable of doing a good job. We assess their people, their policies and practices, understand how they function, and make sure that the way they operate comports with the type of management we want for our funds.

We can also refer to others who've used the managers we are considering and get their opinions. And, of course, we have to ask ourselves what kind of performance criteria we've established for our funds. It's a pension fund so that says one thing about it—it's got to be here a long time. When we've assessed these characteristics and attributes, we then begin zeroing in on money managers who seem suited to manage our particular kind of fund—we're not exactly a go-go mutual—and we arrive at several recommendations. The Board bases its approval on one or more of these.

Next, we sit down with the appointed manager or managers and discuss the details of the appointment. We agree on the time of take over, and how the transfer of funds would be made—cash, or securities, whatever. We'd discuss objectives and get them as clearly articulated as possible. And once again we'd evaluate that money manager's operations and make sure that our objectives fit, mesh well, with the way he operates. We must know that he fully understands our simply stated objective about maximizing total return, consistent with prudent risk-taking by trying to deduce what that means to him, and how he'd accomplish it. When he spells out how he would—the kinds of investments he'd make, the proportions he'd invest in fixed income securities and common stock, given various market conditions and so forth—we'd discuss these areas further and assure ourselves that his approach would integrate fully with our objectives. We'd thrash out all the pieces, discuss any constraints—such as maximum level of common stocks, per cent of the portfolio allowable in a single investment or security—in short, we'd discuss any guidelines he needed to know about.

With a meeting of the minds on these points, we would have taken the first step. We'd then get the cash flowing to him, get the securities transferred to him on a monthly basis or however necessary, and he would begin to make investments, assemble a portfolio, remake an existing one—in other words, structure that portfolio to his own style, if you will.

Q. How often do you meet with the money managers to monitor progress?

A. Usually, quarterly—although circumstances can alter that in either direction and it depends on what we have to discuss.

Q. What points do you discuss with them in particular?

A. We discuss their view of the economic scene and its impact on the market and, most importantly, how they intend to invest for us given that outlook. Then we monitor what they've done over the past several months and compare it with what they said would happen. We try to understand what investment decisions they're making, not to second guess them. They have the responsibility for making the individual investments in securities. We also review their performance—after all, that's really the bottom line—and we let them know where they stack up against other Bell managers.

Q. After a certain time, say at the end of a year, if he hasn't done well do you then remove the portfolio from him?

A. No. Not at the end of a year. A given market strategy may take a full market cycle to bear fruit—that is, anywhere from three to five years. For instance, in the last year, if the money manager felt that stocks with a high price/earnings multiple were not the best investment base, the stocks he bought in 1972 may not have performed as he has expected them to. It may be in 1974 or later that their day arrives. So, if you take too short a time horizon, you can't see an investment strategy through to its conclusion. A money manager has to have our confidence; we have to have the patience to see his strategy through until it has made its contribution to the fund.

Of course, if the fundamentals involved in the investment decisions seem to be producing no result and there is no prognosis for improvement, we might take action in a somewhat shorter time period than the full market cycle. But the pension fund is going to be here for many years. The worst thing we can do is put the money in the managers' hands and take it out every year or six months. They're not assessing the earnings potential of investments for only six months. In that sense they're not traders. They're investors. They're investing in a buy-and-hold strategy to let the earnings potential of the investments come through.

While this is going on, though, we have to be sensitive to basic operational changes, like losses of key people, inability to be flexible in investment strategy if changes occur in the marketplace. As I've said, we don't just turn over the funds and wake up five years later and say how did you make out. We monitor. If, during the monitoring process, we find a money manager whose strategy is way out of line with what other managers are doing, we ask him what he sees that no one else sees. We try to check the validity of his analysis, and we try to get him to check it too. If he's wrong in his strategy, we don't just take our business elsewhere. We talk about his analysis. We discuss his people. We examine his strategies. We try to get him to strengthen those areas where weaknesses are evident. You see, we don't want to lose what may be a basically good money manager; we want him to get better.

Now if he's continually unproductive even after we've discussed it with him, then we might take steps such as reducing cash flow or, more drastically, even removing the account altogether.

Q. What do you mean by good organization in reference to money managers?

A. The money manager's organization should be setting goals and should organize to implement them. That's what we're really after: to see that that organization is soundly based as it tries to deploy our funds.

There has been a tremendous evolution in the money managing business in the last five years. Competition wasn't as keen as it is today. The impact of the independent on the traditional bank money managers wasn't felt then as it is now. We didn't have all the current measurement services to evaluate money managers—we didn't even have general agreement on measuring and comparing performance among managers.

Q. It would seem that the most effective tool to evaluate performance is to ask if the manager made money or not.

A. True. But you've got to be able to measure what he did vis-à-vis his peer group in some uniform way. We gauge performance, in part, by comparing common stock results with the Standard and Poor 500, which is a performance index of 500 selected stocks. We also look at the average of all those who are managing Bell System money, because that's a broad universe uniformly measured, a peer group as good as any we can come up with.

This approach is particularly valid on the debt side because there are not yet good market indices for measuring performance in fixed income securities. As for equity, we've got common stock universes, market measures, S&P, the Dow-Jones index—it depends on which one you think is most appropriate. We've been using the S&P 500.

But, as far as measurement is concerned, it developed only recently as a sophisticated tool. Here, let me read this quote from *Pension's* magazine:

"When one stops to reflect, it is less remarkable that investment managers were not providing performance information to their clients than that they did not realize that investment performance information was a fundamental tool for internal management control."

Q. What does that mean?

A. It means that back in the early stages of measurement there was no consensus on measurement techniques and, further, that many managers were not providing their clients with performance information. Maybe that's bad, even worse is the fact that if they had it—it may not have been perfect—they weren't using it as an internal control device to try to look at whether they themselves were competitive and, if not, why not? They weren't using it to make fundamental changes in their own operations.

Q. It would seem basic that you could call up and ask your money manager how he's doing.

A. If he knew. Suppose he wasn't measuring?

Q. That would seem to indicate that he wasn't running a very efficient operation, wouldn't it?

A. But if at that point in time most managers weren't measuring, then you might not get too excited about your own manager.

Q. Wouldn't it seem basic to know on any given day what the performance level is?

A. In 1973, yes. In the early and middle 60s, no. Because hardly anyone was asking.

Q. It seems implausible not to ask.

A. It was not a competitive market place. They didn't have all these other money managers trying to get

into the business. People handed them money; said, run it; and that was that. Today it's a different ballgame. They all realize it.

Q. What happened?

A. For one thing you've got the computer. You can measure a lot of things you couldn't measure then. To calculate quarterly rates of return on market, to calculate dividend yield plus market price appreciation, to risk-adjust return based on betas (which are a measure of how a given portfolio should perform under various changes in broad market indices), and all the sophisticated measurement techniques . . . all of that has come about within the last several years.

Q. And yet people were able to get reports on their stocks the same day long before the middle 60s.

A. Yes, on a single stock, or on two or three stocks. But suppose a trustee was managing a portfolio. He'd say: "Do you realize we've got 50 stocks in that portfolio? You expect me to get an answer today? I can hire a few Kelly girls and we can start calculating and I may have an answer for you in two weeks." Today, I can call a firm providing measuring service and say, "I'd like the betas on my portfolio and I'd like some risk-adjusted portfolio measures vis-à-vis the market." And they'd say, "All right, we'll get on the time-share computer." And in half an hour, they've got a printout and it's on its way over by messenger. It's that kind of situation today: daily market prices built into somebody's disc storage so they can provide betas calculated on weekly market prices, or average returns based on weekly market price movement plus dividends, and so forth. And AT&T moved with the leading edge of this sophisticated measuring. We were probably measuring, at least on market performance, far ahead of most others.

So, to answer the earlier question: yes, one of the measures of performance is whether or not a manager made money but it's important to know if that performance resulted from good planning or good luck. And with all the arising sophisticated measurement techniques, we can reach a better determination on that score.

Q. You mentioned judging firms, in part, by the objectives they set, but how has performance been in those firms whose executives go to their staffs and tell them to bring back a good return in whatever way possible?

A. I call that a superstar operation. Based on the last market cycle, they were not consistently good performers. In general, the money managers operating with sound investment objectives implemented by good people—with good planning and analysis—have outperformed the superstar firms. I do think it's pretty obvious that an individual portfolio manager has some upper limit on the number of dollars that he can manage efficiently—$250 million might be a reasonable figure. If you're trying to manage $5 billion, say, or $10 billion, you've got to find a lot of stars and it's highly improbable that you can do it and give them each free rein. You've got to find a more structured approach to investing $5 billion than to turn 20 people loose, all going in different directions. I don't see how, given the same set of market circumstances, they could all perform well with 20 different market strategies.

The portfolio manager, instead of making the basic decision about strategies, should be applying his talents to making investments based on an overall strategy and making them well, in timely ways, with minimum impact on markets and market places, to bring portfolios into adjustment with the overall investment strategy. So, do you want portfolio managers, recognizing their investment talents, *making* policy or *implementing* policy? In some places they've been making policy and it's no policy at all. And that doesn't seem appropriate for us.

Q. What do you look for in people who manage money?

A. You can't look at just the individual manager. You look at the total organization. Who is the man heading the organization? What kind of a background does he have? What is his track record as a manager? Has it been a success? What kind of people has he surrounded himself with? Do they appear competent? Do they have experience? Training? How do they make investment policy? Do they have strategy setters doing it? What sort of inputs do they use? Do they have good economic analysis? Good research input?

And then we look at the kind of people managing the portfolios. Do they have a high job turnover? Have they advanced through jobs that would give you confidence about their backgrounds? Do they perform? Have they performed in the past? How broad is the dispersion of performance across the portfolio within that organization? It's not enough to know how the organization has performed on average. We don't want to dictate who runs our portfolio, but we do want to know what the dispersion of returns has been as individual portfolio managers implement policy. Is it widely diverse and, if so, why? We'd prefer to see a clustering around a good

performance level rather than widely diverse performance.

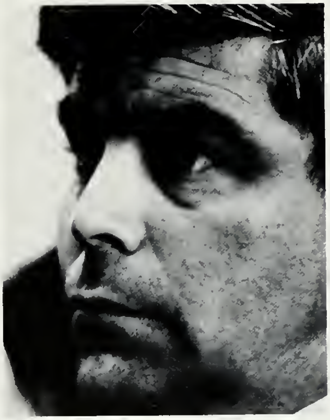
Q. All right, now you've selected a firm. You encourage its people to maximize return for the long pull and take prudent risks in doing so. The key word is *prudent*. What do you mean when you tell a manager to take prudent risks?

A. I guess in the broadest sense, it says that you wouldn't make an investment that a prudent man wouldn't make. One means to monitor whether the manager's investments can be considered prudent is to go to an independent market consultant (AT&T uses Smith Barney & Co.), and ask them what they know about, let's say, the XYZ Corporation. They may come back and say it has had negative earnings for the past five years, or it has these positive and negative scores; or they may say they don't know a thing about it. In the latter case, we might go back to the money manager and ask why it is he bought XYZ, what it is he sees in the corporation that convinces him it's worth owning. And he might say something like, "Well, it's a local firm. We know it pretty well because it does business in this locality. Their officers have backgrounds that indicate competency, and we see growth potential. So, we think we know enough about the firm to make it worth owning." We'd probably say, "fine, thank you, good-bye."

If, on the other hand, we were working with a money manager whose performance hasn't been as productive as we'd like, we'd dig a lot deeper. We'd want to know a lot more about his decision to buy XYZ. So, getting back to prudence, you must apply surveillance, you must build rapport with a back-of-the-mind knowledge of the manager's past performance.

Q. You made news in financial publications with your report on a study of pension fund managers. Briefly, what was the result of that study?

A. You're probably referring to the presentation I made with Dick Klemm [Manager, Pension Fund Analyses, AT&T] at the Wharton School at the University of Pennsylvania. We said, in essence, that in the past six years we've found banks to be a competent source of investment management expertise compared with all professional managers. We studied the performance of 30 banks managing over $3.5 billion in common stocks and found their ability at least comparable with a broad cross section of other professional managers. Since the study began, the value of their investments in equity has gone up by 68.2 per cent. The mutual funds, by comparison, went up 68.6 per cent in the same time.



Q. Does that mean you intend to concentrate solely on banks for managing money?

A. Not necessarily. We currently utilize 73 managers, of which 56 are banks. We'll go where we see the greatest probability of good long term performance. We did the study in connection with our normal surveillance activities. It showed that we were correct in using banks in the past and certainly suggests that we should rely heavily on them in the future—but not exclusively.

Q. Do fund managers get a commission on what they earn, or are they paid a set fee by contract? What are the arrangements?

A. They are paid a fee based generally on the market value of the assets managed. The fee is scaled so that the rate decreases as the size of the fund increases.

Q. Do you and your organization plan investment strategy for the whole System?

A. No. All responsibility for direct dealing with their money managers rests with the local companies. We do provide assistance and expertise, and we monitor and review performance by all managers. We don't interfere. We have a good working relationship with the companies.

Q. Taking all the money managers into consideration—banks and professionals—how effective has the System been?

A. We can take the area of common stock as a "for instance" and look at the performance of the average money manager for the Bell System for the last six years. In the first two years we fell below the New York Stock Exchange Composite index. In the middle two years we were on par with it. And in the last two years we've been significantly above the market averages. Further, our average results during the whole period have been competitive with managers of other large pools of capital. I might add that, over the whole period, it has been difficult to better the "market," and our money managers are not significantly different in that regard.

We feel that improvement in the last two years is at least partly due to our efforts, doing more to build rapport, to achieve effective surveillance. We've been working more closely with the money managers in these last two to three years than we did in the past. Furthermore, the money managers are much more aware of our fundamental methodology which, I believe, has had a positive impact.

Put all those together and we think it has had something to do with the improved performance. Attention begets interest and improved performance. So, we're going to continue to keep paying this kind of attention—do it better; keep honing our expertise, if you will; keep trying to upgrade the bottom performers. Or, when we see no improvement, despite our best efforts, drop those managers and move the money to the better performers. And that's our job—to assure that we constantly have the best money managers going for us. □

Energy Today and Tomorrow

by A. J. Meyer

One of the by-products of the burgeoning debate over energy has been massive air pollution from vocal, rather than hydro-carbon sources. As a contributor to this pollution, as well as one who daily suffers through it, it was with great pleasure that I finally discovered one speech on the subject by a man with no apparent axe to grind. He is Dr. Thomas Paine—now a vice president of General Electric and formerly Director of NASA. Speaking in San Francisco recently, Dr. Paine said:

The (energy) crisis would not have erupted if there had been no regulation of natural gas prices, no low cost foreign oil, no popular movement of concern for the environment, and no prospect for nuclear energy. Without those factors we could have sensibly developed our mix of fossil fuel reserves and made sound plans for developing our vast domestic resources with reasonable environmental constraints.

To one who spends most of his waking hours reading, writing and teaching about energy, Dr. Paine's remarks were concise, accurate and refreshing.

The flood of studies, conferences and colloquia on this energy problem have made several facts abundantly clear. The world's supplies of fossil fuel are still far from exhaustion, despite our insatiable appetite for energy made from them; despite this, energy "crises" of varying types and severity are increasingly imminent—not only for the United States, Europe and Japan, but for most of the "third world" as well.

Yearly, the world produces, and consumes, about 50 Qs ($Q=10^{12}$ Kwh or a million million Kwh) of energy. Of this, fossil fuels (oil, gas and coal) provide 90 per cent and the remainder comes from hydropower, wood and nuclear sources. Today, at least 80 per cent of world energy production is consumed by the U.S., Europe and Japan, and

---

A. J. Meyer is a Lecturer in Economics and Associate Director of the Center for Middle Eastern Studies at Harvard. His article draws on his statement before the Senate Committee on Foreign Relations, and material he has published in the Christian Science Monitor *and* Petroleum Intelligence Weekly.

that percentage probably will hold for at least 30 more years. End-use patterns vary somewhat, but basically the big industrial nations differ little among themselves.

Demand, however, is rising enormously, and seemingly inevitably. By 1985, world energy consumption will certainly more than double and, by the year 2000, more than quadruple. Over 200 Qs of output and demand, for all energy, seems a reasonable forecast for the end of the century. By 1985, fossil fuels will almost certainly still provide three quarters of the world's energy and by 2000 A.D. about the same. Over these years, coal's relative role will have dropped somewhat (although tonnage will rise enormously), and nuclear energy will (hopefully) account for about 20 per cent of world energy needs by century's end.

The emerging paradox

This raises the question of "are there enough fossil fuel sources available worldwide to sustain these enormous demand increases?" The answer to this question is an emphatic yes. A sensible consensus of forecasts on economically recoverable fossil fuels shows at least 35,000 Qs potentially available, enough to last us several hundred years. Two-thirds of these reserves (24,000 Qs) consist of coal and lignite, and one-third (10,000 Qs) are in oil, gas, oil shales and tar sands. The world's fossil fuel resources are still huge.

Reasons for the paradox of "crises" in the face of plenty are several. First, it is clear to all that nuclear energy as a challenger to fossil fuels is maddeningly slow in arriving. Since 1945, for example, the U.S. has acquired less than two plant years per year of nuclear power generating experience—and less than one per cent of our energy comes from nuclear plants. At the moment, we are spending about $1 billion yearly on non-fossil fuel energy experimentation—much of it on the liquid metal fast-breeder reactor. Although we have altered the 1901 *Webster's Dictionary* definition of uranium as a "worthless metal," we have made precious little progress in putting nuclear power to work in the American economy. The reasons are well known—high cost (relative to fossil fuels), difficulties with the disposal of heat and radioactive waste, and fears of radioactive exposure of nearby communities. If the breakthroughs do come, the world's energy problems could be solved for thousands of years. But I repeat, they are unbelievably slow in coming. And, I also remind you, these same breakthroughs have been "just around the corner" for a quarter of a century.

Second, we have made even less progress in developing "far out" substitutes for fossil fuels. I refer here to schemes for harnessing ocean temperature gradients (such as the Caribbean thermocline, magnetohydrodynamics, fuel cell energy, solar energy and the other potentially rich sources of power. Research goes ahead, at snail's pace, and the cost for these fossil fuel substitutes remains prohibitive.

Third, the most progress *still* seems to be occurring in the processing and utilization of fossil fuels —extracting sulfur from fuel oil, drilling in ever deeper water for oil and gas, elimination of pollution by refineries, coal liquefaction and gasification, improved ocean transport technology for oil, cryogenic tankers for gas, shale and tar sands development. Ironically, the big advances are still occurring in fuels which although still abundant, are indeed finite. And for many of these, cost is still prohibitive.

Suppliers' turn

Fourth, the combination of soaring oil and gas demand, sharp upward shifts over the past two years in net per-barrel takes by Middle Eastern governments (Saudi Arabia gets about $1.50 per barrel today, Libya over $2.00 and Algeria well over $2.50), coupled with growing skill in negotiating by Middle Eastern governments, has created a new and interesting situation. These nations not only control major portions of the free world's proven crude oil resources, but they also have at their disposal huge quantities of foreign monetary reserves.

Fifth, and equally thought provoking, is the residual impact of the dramatic shifts now taking place in arrangements for producing, transporting and marketing Middle Eastern oil. The Teheran, Tripoli and Geneva negotiations of the past 30 months have led to sharp upward revisions, not only of revenues to producing governments but also of energy costs to all concerned—ultimately to all of us, you and me. The Organization of Petroleum Exporting Countries (OPEC) participation negotiations will certainly have the same effect. Added to this, on the heels of the Teheran and Tripoli meetings, Iraq and Libya have undertaken partial nationalizations, as had Algeria earlier and more completely. Rare indeed today are those intervals during which an "eyeball-to-eyeball" confrontation between producing governments and oil companies is not actually taking place or about to begin. Oil companies are really under the lash, and their historic role as middlemen between producers and consumers is being challenged lustily.

Reliance on imports

Sixth, it is now discomfitingly apparent that the U.S. is at present "peaking out" as an oil and gas producer, just as our requirements for these fuels are making quantum jumps forward. (During the decade of the 1970s, for example, the world will consume more oil than it consumed in the tens of centuries of recorded history.) Consequently, whether we like it or not, the U.S. seems hooked—for the next decade at least—on oil and gas imported in ever greater quantity from the Middle East and North Africa. Like Europeans and Japanese before us, we Americans now face the two-fold task of paying for these imports and adjusting our international political arrangements to minimize chances of supply interruption.

The implications of these changing circumstances are staggeringly complex. The U.S. will probably increase its imports of Eastern Hemisphere crude oil by a million daily barrels each year for at least the next decade, perhaps longer. By then, half our oil and perhaps a third of our total energy could come from Eastern Hemisphere sources. Much of this oil will be very cheap to produce (6¢ to 25¢ per barrel), yet it will be increasingly expensive to the ultimate consumer. Landed

costs at eastern seaboard U.S. ports are moving rapidly upward towards $5.00 per barrel. OPEC nations' revenues will soar from $9-$10 billion yearly now to $20-$35 billion yearly by 1975, and to perhaps twice that by the early 1980s. Up will go also the balance of payments deficits of oil importing industrial nations—the Chase Manhattan Bank forecasts $20 billion annual deficits for the U.S. alone within the decade. Levels of investment of all kinds will be huge, as will the flows of reserve funds from oil exporting nations back to the two world capital markets wide and deep enough to accommodate them—London and New York. Saudi Arabia alone, under highly probable circumstances, might well control, 10 years hence, financial reserves greater than those backing the U.S. dollar and the Japanese yen together.

Gas will also be an increasingly important part of the U.S.-Eastern Hemisphere economic interdependence during the next decade. Algerian gas in modest quantities now flows to eastern seaboard U.S. markets. Sonatrach (the Algerian Hydrocarbon Agency) has made contracts so far for about 20 billion cubic meters yearly and is negotiating contracts involving more than twice that amount. Other Middle Eastern and North African countries may soon follow Algeria's lead, negotiating export contracts involving gas transport in cryogenic tankers or in convential tankers as methanol. So probably will the Soviet Union. Whatever occurs, investment magnitudes will be huge, gas imports to the U.S. probably will not exceed 10 percent of U.S. needs, and total costs to the U.S. economy and balance of payments will be much less than those for oil. Nevertheless, gas is joining oil as an element of growing importance in this unique economic relationship.

Culprits, quick prescriptions

One striking feature of this curious relationship is the growing volume of discussion about almost every aspect of it. As only one academic interested in energy, I have invitations for conferences on some phase of the problem almost every week. They occur by the score in New York, Boston and Washington, and they testify to intelligent interest in what could become one of the major problems of our time. Many meetings are distinguished by handwringing, attacks on one or another "culprit" in the energy drama, and quick prescriptions for therapy. Obviously much of this is sheer drivel. Some of it is thinly disguised promotion for someone's commercial or political aims.

Several problems have received particular attention recently. First, there is the matter of the huge financial reserves now building up under Middle Eastern ownership. Next, there is the more crucial question of whether Middle Eastern nations will make oil available in the huge quantities we shall soon desperately need. Third, there are at this juncture many "solutions" being proposed to deal with the energy problem, "crisis" or challenge. I shall treat a few of these.

Facts, not folklore

One of the subjects frequently discussed—and rarely with knowledge and lack of emotion or bias—is that of the magnitude and employment of financial reserves owned by Middle Eastern and North African nations. As it could be of some importance in shaping our attitudes on the whole matter, it might be worth a look. First, a few facts. Today only three oil exporting nations have substantial foreign reserves—Libya ($2.8 billion), Saudi Arabia ($2.5 billion) and Kuwait ($4 billion). Of these, which total between $9 and $10 billion, about half are currently placed in Euro-dollar or dollar bank deposits or debt or equity investments. Libya's and Kuwait's holdings probably won't increase very much, and Saudi Arabia alone is the nation whose foreign reserves seem headed for quantum jumps upward. Iran—which is not an Arab country—has negligible foreign reserves, a massive debt load and plans to spend its oil earnings for the next two decades mainly on arms or at home. Unless a miracle occurs, the big Middle Eastern holder of foreign reserves will soon be Saudi Arabia—all others will be insignificant by comparison. Libya now spends more than her oil revenues and the projected union with Egypt will, if it comes about, make short work of Libya's now substantial reserve holdings.

U.S. folklore and press reports to the contrary, all three of the big Arab government owners of foreign reserves—Libya, Kuwait and Saudi Arabia—held their dollars through the recent devaluation and took losses totaling nearly $300 million. While the governments stood their ground, Middle Eastern individuals and companies undeniably joined U.S. and European banks and multinational corporations in the flight from the dollar—mainly into Deutschmarks. Recent estimates indicate that about $6 billion moved from Euro-dollars into Deutschmarks, and of this about $1.5 billion was owned by Middle Easterners—Arabs, Iranians and Israelis. The big travelers in the flight were Western banks and corporations.

To the cleaners?

The question now arising is the following: Will Middle Eastern oil exporting nations, particularly Saudi Arabia, in the future become international money market "gunslingers" and abandon their quarter-century-old preference for U.S. banks (Saudi Arabia and Libya's example) or triple-A bonds (Kuwait's preference)? Will these nations buy up all the world's monetary gold? Will they use their massive holdings in speculation against the dollar and sterling and create worldwide financial chaos? Will Saudi Arabia take its money out of the Chase Bank and World Bank Bonds, join up with the then extant version of Equity Funding and take Europe, Japan and the U.S. all together to the cleaners?

My answer to the above questions is a firm no, for two main reasons. First, the sheer magnitude of Saudi Arabia's foreign reserves will in future limit the Kingdom to bank deposits and investment, mainly in the U.S., Europe and Japan. No other capital market would be able to accommodate such massive holdings. Budapest and Delhi will take a long time to replace New York, London and Frankfurt and Tokyo as capital markets for Saudi funds. Once investments are placed, movement in or out of dollars, sterling, Deutschmarks or yen would be a very slow process to manage, and the lightning-like shifts forecast by many today seem to me out of the question. Second, to expect Saudi Arabia to engage wantonly in financial maneuvers designed to upset the economies of the nations where its funds are invested, and where its oil must be sold, grossly underrates Saudi Arabia's financial acumen.

Another subject discussed often today—again usually with much emotion and little knowledge—concerns the rate at which Middle Eastern nations will elect to pump their oil and export it to a United States, Europe and Japan which desperately need it for at least two more decades. Most countries now have massive development programs which depend entirely on oil exports for funds. Some (such as Kuwait) operate public utilities on gas which can only remain available if oil is pumped. But others, such as Saudi Arabia (and perhaps Iraq in the future) clearly have more funds available than they can absorb in domestic development outlays. And the question of reconciling these nations' financial and economic needs with the energy requirements of the U.S., Europe and Japan is frightfully complicated.

Other complexities

Equally complicated is the task faced by Saudi Arabia in reconciling the energy needs of its big customers with Middle Eastern politics. The tensions between Israel and her Arab neighbors obviously concern Saudi Arabia—as one of those neighbors. Another of Saudi Arabia's neighbors is Iran, with its own territorial and political ambitions. The Palestinian problem remains far from solution, after a quarter century, as violence committed daily by Arabs and Israelis against one another makes vividly clear. Saudi Arabia meanwhile is host to a large Palestinian minority, provides funds to Egypt and Jordan and, until recently, made annual donations to Palestine resistance groups. Saudi Arabia will soon be exporting oil in quantities absolutely crucial to U.S. economic life, while the U.S. continues to make weaponry available in ever greater numbers to her neighbors. This situation obviously creates a few problems—not only for

Saudi Arabia but for us, both as Americans and as large consumers of energy.

Let me now turn to a few of the solutions being suggested to these complicated questions.

One way: massive spending

One solution (advocated by Europeans such as Dr. Paul Frankel and Americans such as Mr. Walter Levy) could lie in the formation of a "consumers club" of energy importing nations—Europe, the U.S. and Japan —which might exercise countervailing power against what some term the "unholy alliance" of producing governments and oil companies. Means of implementing this protective shield have so far failed to materialize, largely because of Japanese and European lack of enthusiasm for associating themselves, in the eyes of their Middle East oil suppliers, with U.S. government arrangements—and indirectly with our Middle East policies. So far, Europe and Japan seem to prefer to "go it alone," without the U.S.

Another solution, currently favored by Congressional energy committees, consists of a massive ($20 billion at least) federal spending effort, along Apollo project lines, aimed at rapid development of nonfossil fuel energy for the United States. These are superficially attractive (and I hope that they will be funded at an appropriate level), but at best they offer a *chance* that substitutes for oil, gas and coal will be found within the next 20 to 30 years. For at least the next decade, we cannot count on them.

A third solution, suggested by only a handful of public figures in America, advocates that the U.S. rethink its Middle Eastern policy so as to ensure that our energy import needs will indeed be met and not put into jeopardy by our own actions. Advocates of this solution espouse cutting back on U.S. arms supplies (particularly offensive weaponry) to *all* Middle Eastern buyers, diplomatic and economic pressure on Israelis and Arabs to make peace, and a frank recognition that U.S. interests in the region lie also in the oil supplying nations.

Yet another solution is that advanced by a colleague of mine in Cambridge. He urges legislative action to increase tax burdens on oil companies. This, he feels, would lead by accelerated progression to disastrous price competition within OPEC, to an oil surplus once again, and to bargain energy costs to consumers. Ten years ago this solution was not as wild as it sounds today, and might even have worked. Today, its utility to me lies chiefly in the basis it may afford for classroom discussion.

In this same context, it is safe to forecast that the winter's expected heating oil shortages will draw out still newer solutions in the form of massive attacks on oil companies. Scholarly journals and newspapers already carry frequent articles on this theme. To an American public possessed of wildly wasteful energy habits and long accustomed to energy at bargain prices, there is no denying that oil companies offer a visible and enticing target. Their recent quarterly earnings are up, tankers and refineries will continue to pollute our environment, there will certainly be selective shortages of oil and gasoline and natural gas for the foreseeable future, costs of energy of all kinds will continue to rise. And companies will be blamed, loudly and publicly.

Nonetheless, whether one likes oil companies or not, there is at the moment no workable substitute for them in sight. The energy-hungry world, as well as producing governments, both need them desperately. They earn a very modest (8-12 per cent) return on investment and they perform a task which cannot be done by government agencies or energy boards at this juncture.

Some inconsistencies

The final solution now being explored relates to energy conservation by American consumers and by the U.S. economy as a whole. We all want to "live better electrically" and daily bring into our homes new gadgets requiring more power generated, in all likelihood, from high-sulfur oil or other polluting fuels. We resist heroically any attempts to raise energy costs to consumers, although these are still at real levels lower than in 1940. We watch with clinical detachment while the Federal Power Commission maintains gas prices at levels which discourage exploration, encourage uneconomic consumption, make import arrangements difficult indeed to conclude, and virtually guarantee a series of gas crises.

As our per capita electric consumption edges upward inexorably, we join conservationist groups and work ardently to block Arctic pipelines and nuclear plants. We continue our love affair with the 8-mile-per-gallon automobile, equipped with automatic transmissions and air conditioners; use it to move 130-lb. American women about (usually alone); add mileage-cutting anti-pollution devices yearly; and continue to fill our tanks with high-octane rather than no-lead gasoline. But the studies are now emerging which point to the cost of all this—for example, automatic transmission consumes between 400,000 and 500,000 barrels of oil daily (out of a U.S. total oil consumption of 15 million bpd) because of diminished mileage, for a cost to the U.S. economy of close to $1 billion.

Reasons for hope

We overheat our houses and open windows to cool them. (Professor David Rose of M.I.T. has estimated that Manhattan Island each day puts more heat into the atmosphere than the sun lavishes upon it.) Each day we buy more items packaged in throw-away aluminum containers—made from the most energy-intensive metal of them all. We too, all of us, play a self-destructive role in the energy drama.

In conclusion, let me say that despite the many unknowns, I remain optimistic. There are reasons for hope that absorptive capacity for internal development funds will continue to improve in Saudi Arabia —under pressure of a vigorous effort currently underway—and that it will elect to increase oil exports at rates commensurate with the energy needs of Europe, the U.S. and Japan. Our oil companies remain vigorous and functional, and hopefully, the negotiations on oil matters will continue to concern themselves, as they do today, with dollar-parity, and not with something much more ominous such as parities between arms deliveries and oil export levels to the nation exporting the arms.

...and the implications for the Bell System

by Joe H. Hunt

Assistant Vice President AT&T Plant

We'll have to recognize at the outset that a serious shortage of energy–either fuel or electric power–would have a harmful effect on the operation of the communications network. This effect would naturally be felt throughout the country and, in fact, the world.

For this reason we are concerned about the availability of power. From a purely selfish standpoint we –like any other business–want to keep our operations going. But, as stewards of about 80 per cent of the nation's telecommunications capacity, our concern about possible shortages goes quickly beyond our own considerations.

Efficiency is a byword in the operation of the network. We build plant with every known factor of efficiency engineered into it. We always have. Efficient plant operation just makes good economic sense–and a fortunate precedent for a scarce energy situation.

But we have been able to enhance routinely achieved conservation of power with nine additional steps that we initiated this year in March. These have included such practices as the rather simple procedure of turning off lights in areas where they are not constantly needed. We've shut off the heat supply to storage rooms and areas where heat is not essential, unless there is a danger of freezing. And we'll run heating and air conditioning units at the lower end of safe tolerance levels required for efficient operation of switching machines and other equipment.

Facilities housing people will be kept comfortable, of course, but we can conserve power in the summer by cooling office areas to a temperature of, for instance, 75 degrees instead of 72 degrees. That three degrees can mean quite a power saving.

In my opinion, fear that an energy shortage will cause a cessation of our operations is exaggerated. It seems unlikely that we will ever arrive at so desperate a situation. But it will serve well if we all know how the energy "crisis" affects us.

The Bell System has some 28,000 buildings and 160,000 motor vehicles. Last year we consumed four billion kilowatt hours of electricity. (In comparison, the average family dwelling consumed about 5300 kilowatt hours.) We used 150 million gallons of gasoline, 47 million gallons of fuel oil, nine million gallons of diesel fuel, two million gallons of lubricating oil, 330,000 gallons of hydraulic oil, 4.3 million pounds of liquid propane, and 90 million therms of gas. The average home could be heated for a year by 1550 therms.

These figures do not reflect wasteful consumption. They indicate the magnititude of our operations and the energy consumption level that is required to maintain them.

Should power supplies appear to be threatened significantly we would, of course, expect the federal government to begin setting energy priorities for vital services. Long term continuity of communications –dependent on an assured supply of energy from outside the Bell System–is one of these services.

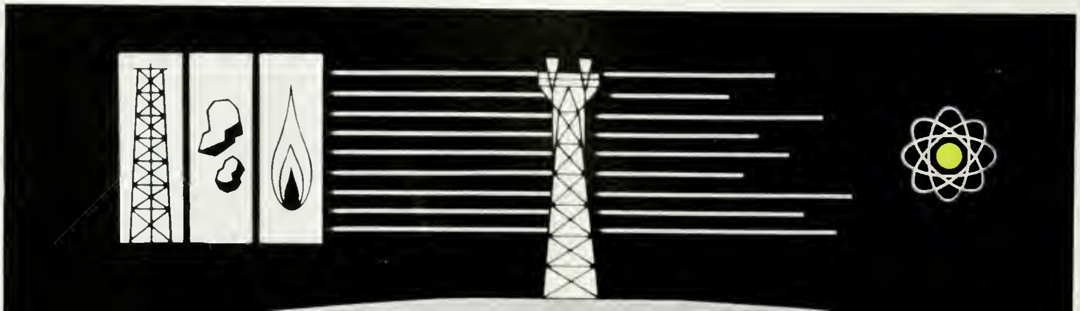
In any short-term crisis we have the capability of generating enough power to continue operating. We have a System-wide generating capability of about 1500 megawatts through stationary and portable equipment. Those who recall the massive power failure in the Northeast in 1965 will also recall that telephone operating offices in that region of the country were able to function during the blackout on emergency power generated within.

Short-term, unfortunately, is the key word. A long-term crisis would seriously affect our ability to provide service. Long-term translates into any major power shortage lasting more than a few days.

Emergency generating equipment in most central offices has sufficient fuel supply to last for about three days. In offices deemed to be of critical importance, we maintain a 14-day reserve fuel supply. With central office batteries fully charged, we can gain a few added hours of operating capability.

Operating our emergency generating equipment for periods longer than a few days is not advisable as a means of conserving electric power. In the first place, diesel and gasoline generators consume fuel which would also be in limited supply if we were presumed to be in an overall energy crisis. Secondly, the cost of buying fuel would be astronomical.

Fortunately, nothing dire is at hand. Pessimistic predictions notwithstanding, there is no need to feel pressed into drastic action. In my opinion, we have all the ability necessary in this country to solve the energy problem–but it means setting up priorities of national needs and doing our utmost to accomplish them. Because telecommunications are vital to the nation's well being, and energy is essential to telecommunications, I think an assured supply of energy should top the priority list.



EDITORIAL

As Machiavelli Said…

A recent "Report to Management" from the Opinion Research Corporation spelled it out: "Big business is big news, whether it likes it or not." As part of the evidence, the report noted that "editorial interest in what companies are doing in the area of social responsibility now is almost as great as it is in straight financial news." Since the subject of the ORC document was the reputed swing toward advocacy journalism in business reporting, the matter—like a cry of "Iceberg!" or "Torpedo!"—tends to invite one's interest.

Still, it hasn't exactly been a secret. Business has known for some time that its performance is constantly being reviewed—often enough, as someone expressed it, the way pigeons review a statue.

And the implications have had to be confronted. In a speech at Rutgers about a year ago, AT&T President Robert Lilley dismissed the traditional notion that corporations are impervious to criticism in that they have neither a soul to lose nor a body to kick. On the contrary, said Mr. Lilley, "they can lose their Dow-Jones; they can be kicked right in the Late News."

Of course, there is the question as to how much it really matters, after all, whether what is said about business is true, if it only has to be *perceived* to be true for business to be knee-deep in roses or skinned alive. Perhaps, willy-nilly, the image presented *is* the decisive factor, whether it is a reasonable likeness or not. In such circumstances the cynical may recall the exchange that allegedly took place between two television producers a few years ago: "The important thing," said one of them, "the *only* important thing, is sincerity. Once you can fake that, you've got it made."

Nonetheless, whatever the case, and for reasons even beyond the fundamental matter of ethics and self-respect, this particular business is determined that its image will match its actual features. Ma Bell is more than presentable—downright fetching again—as various nationwide service indices would readily confirm. And while it may serve elsewhere to fill in the gaps of performance with some sweet sounding public relations, that hasn't been our way. As the old tune had it: Momma don't allow that kind of music here.

The point is that whatever kind of journalism is at play—letting charity assume for the moment that advocacy journalism is, in fact, journalism—we are going to have to speak out. We are going to have to tell our story. The need is pressing, the stakes are large, and they involve in the end far more than the concerns of legitimate self-interest. A *Fortune* article entitled "Business Needs To Do A Better Job Of Explaining Itself" has shaped the issue in its proper dimension:

"In short, the declining reputation of business could, unless it is reversed, weaken the internal morale of corporations and so poison the relations between business and the rest of society that the quality of American life would deteriorate."

In a recent series of effectively stated editorial messages, McGraw-Hill Publications endorsed the position. Said its president, John R. Emery:

"We believe that, particularly among the major groups—business, labor and government—there is too little recognition of our mutual dependence, and of our respective contributions. And we believe that it is the responsibility of the media to improve this recognition."

Things will not be quite the same, of course, once business has begun to abandon its cosmic detachment and undertake seriously its own public defense, to answer its critics wherever that must be done, and to enlighten general attitudes where they are mischieviously ill-informed. (For example, according to both *Fortune* and the McGraw-Hill messages, most Americans believe that the average company in this country makes a profit of 28 per cent of total sales, whereas the actual percentage is at best closer to a fifth of that.)

If business is effective and is accorded equal time in the spotlight, it may be that it won't always relish the experience. Teresa of Avila noted that answered prayers can be the worst kind. (As a for instance, we dearly wanted a certain foreign car once, and grimly recalled Teresa's observation every time we were towed in for repairs or underwent the periodic check otherwise known as the stick-up.) But there is simply no alternative, other than to add more evidence to the judgment an old hand like Machiavelli delivered some time ago: "The absent are always guilty."

Once, responding to charges of moral indifference, a Western diplomat asked a Middle Eastern representative why professional effort was not made to bring their grievances to the attention of the world for redress. The reply was that the cause itself was no unarguably and manifestly just that its validity must eventually make itself known unaided. The diplomat could have laughed, or wept.

SAINT LOUIS
MO.

U.S. POSTAGE
PAID
PERMIT 462

KANSAS CITY PUB LIBRARY 001
PERIADICAL DEPARTMENT
KANSAS CITY MO 64106

AT&T

American Telephone and Telegraph Company
195 Broadway, New York, N.Y. 10007

Moving? Please inform the *BTM* circulation coordinator in your Bell Company's Public Relations Department. **Please include the mailing label from this issue.**

Printed in U.S.A

Printed on recycled paper.

Bell
TELEPHONE MAGAZINE

KANSAS CITY, MO.
PUBLIC LIBRARY
DEC 5 1973

NOVEMBER-DECEMBER 1973

"For excellence in achieving affirmative action; for best symbolizing the persuasive and perceptive role that Whitney Moore Young, Jr. deemed necessary for black executives in industry to aspire toward for the good of all in this nation."

Ray Scruggs sums up, page 16

Bell
TELEPHONE MAGAZINE

VOLUME 52 NUMBER 5 NOVEMBER-DECEMBER 1973

2 **Service is Back Up There**
A comprehensive study substantiates the progress made in improving telephone service nationally.

6 **New Seven-League Boots**
By Donald R. Woodford
The forthcoming field evaluation of millimeter waveguide marks the initial step in implementing this supercapacity system.

10 **To Err is Human—Or is It?**
By Edward J. Swartz
Fifty per cent of all on-the-job errors can be traced to personal factors, according to research being conducted at Bell Labs.

16 **To Ramon S. Scruggs, Sr. for Corporate Excellence . . .**
By William P. Kuhs
A salute to AT&T's minority affairs director whose courage and dedication have helped enlarge the human dimensions of this business.

22 **Why Science?**
By Dean Gillette
In response to criticism of technological development, Mr. Gillette explains the benefits of scientific inquiry.

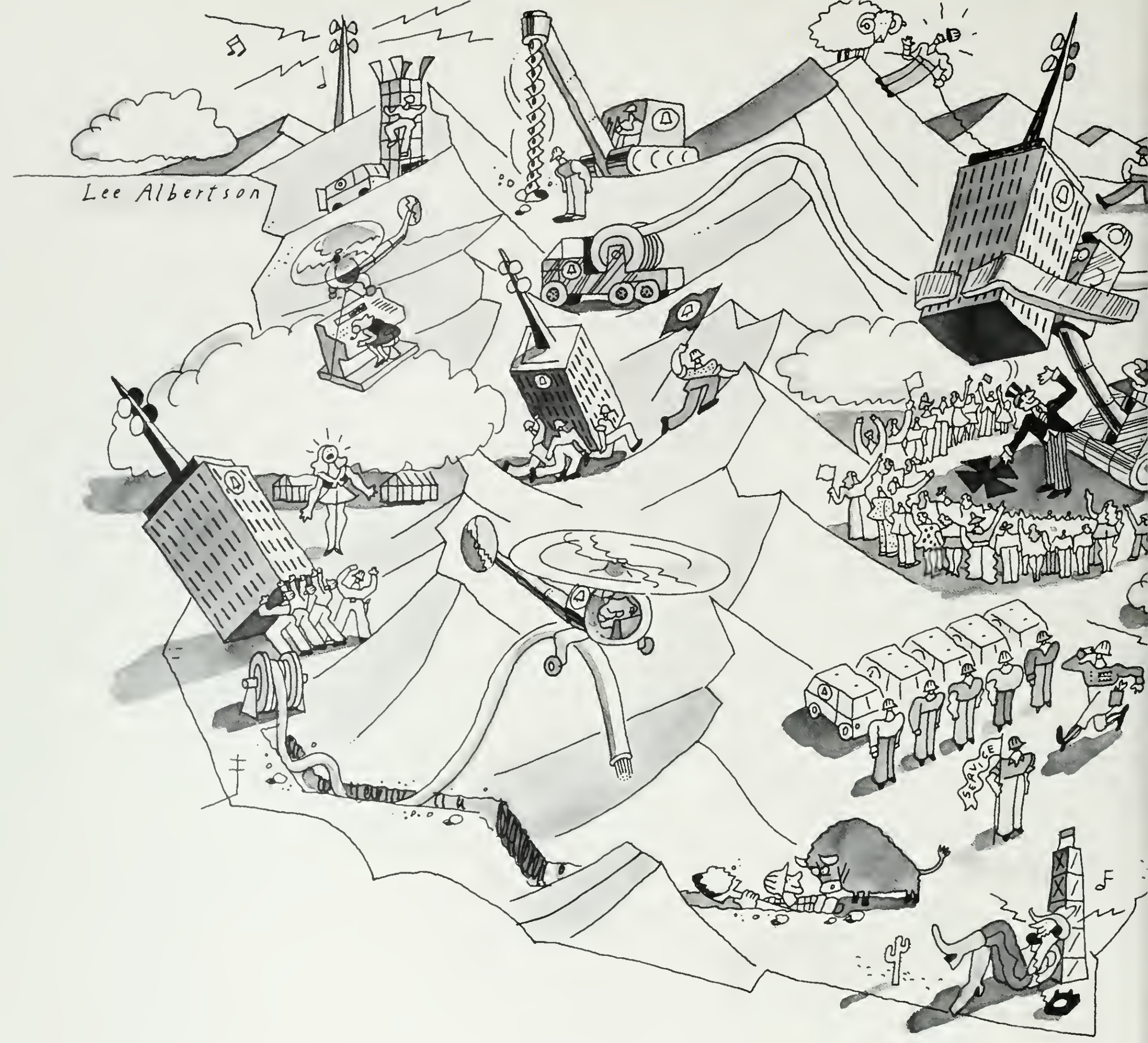
26 **Sandia**
The non-nuclear fallout from Sandia's research has produced valuable civilian benefits.

30 **Just Between You and Me**
By Bailey Markham
How managers can do a better job through face-to-face communication.

John D. deButts
Chairman of the Board
Robert D. Lilley
President
William L. Lindholm
Vice Chairman
Frank A. Hutson, Jr.
Secretary
William L. Mobraaten
Treasurer

Leonard Moran
Editor
Al Catalano
Art Director
Donald R. Woodford
Managing Editor
David M. Bicofsky
Associate Editor
Edward H. Spencer
Associate Editor

Published by
American Telephone
and Telegraph Company
195 Broadway,
New York, N.Y. 10007
212 393-8255



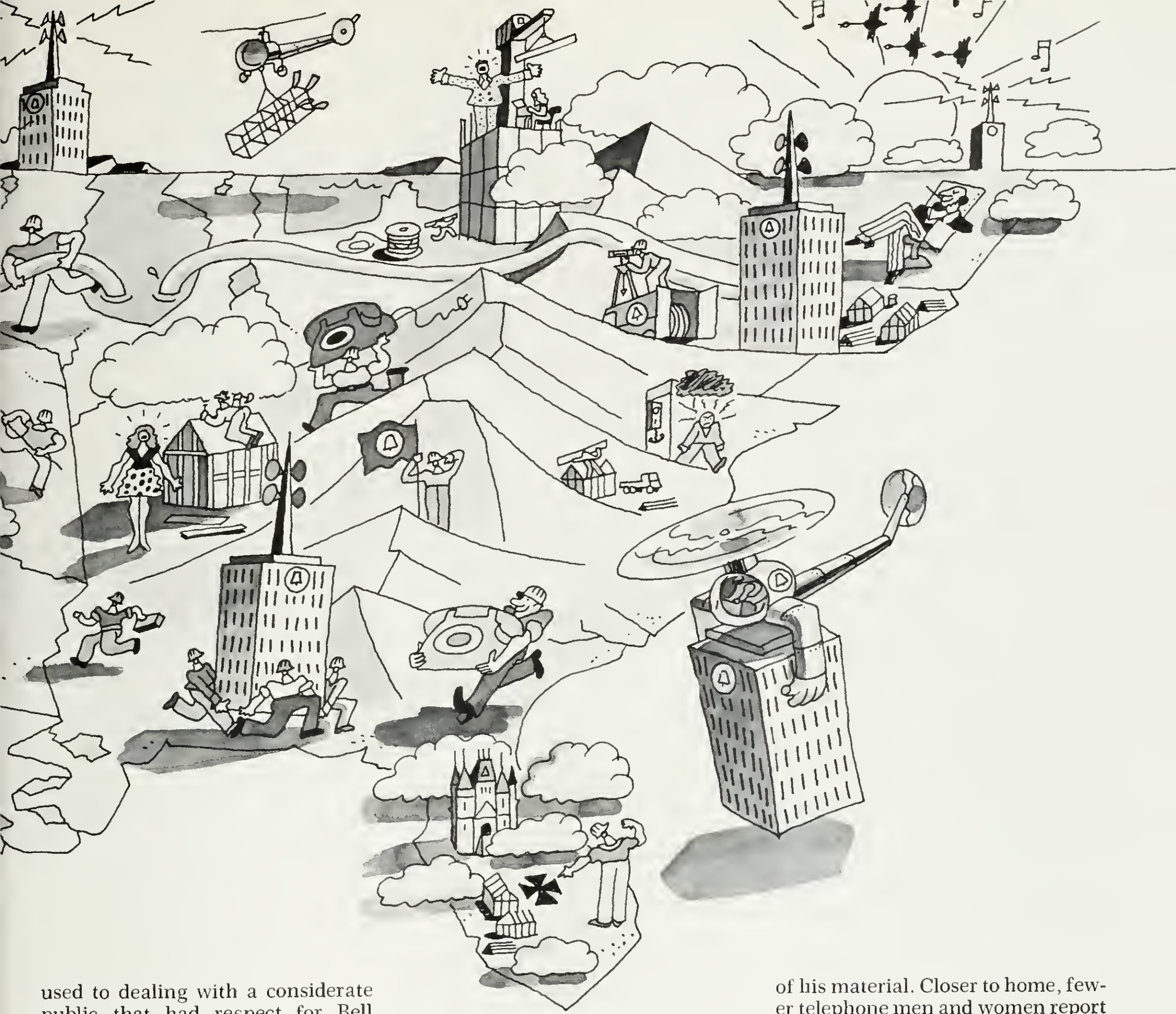
There are earnings problems,
and here and there some
more catching up to be done,
but all in all…

Service is Back Up There

What a difference a year makes.

Speaking before a Pioneer Assembly last year, AT&T Board Chairman John D. deButts remarked that it wasn't easy being a telephone employee at that particular point in time. For, while the System was working hard to correct service deficiencies in a number of cities, and making strong progress, too, a critical public was showing little sympathy for the causes of our plight – demanding, instead, that substandard service be corrected, and pronto.

Long-term telephone employees,



used to dealing with a considerate public that had respect for Bell System achievements, suddenly found themselves being badgered by customers whose memories stretched no further than the time the phone went dead, or the time they got charged for a long distance call they didn't make.

Mr. deButts said there was really no point in wasting time making excuses for below-par service wherever it existed, but pledged that the Bell System would speed its construction program and would take other appropriate steps to bring service up to the levels that customers had every right to expect.

That was a year ago. And, while it might have been a difficult time, telephone employees proved themselves equal to the task of helping make that pledge come true. For, while service was indeed getting better, even at the time Chairman deButts spoke to the Pioneers, in the year following it showed constant and considerable improvement. That improvement could never have taken place without the dedicated efforts of hundreds of thousands of telephone men and women across the country.

Even without quoting the statistics, the happier results should be fairly obvious. For example, it's been quite some time since a comedian of national stature has focused on poor telephone service as the butt of his material. Closer to home, fewer telephone men and women report being embarrassed at social gatherings by customers who seem to hold them personally responsible for service lapses.

For those who feel the need of more solid evidence, the Bell System recently filed with the FCC a comprehensive study of the quality of service being provided in 75 of the Bell System's major operating areas. This is a much broader, more detailed report than the FCC's previous "20 Cities" report.

In commenting on the report, AT&T Operations Vice President Ed Greber said, "The study, released to the FCC in September, shows that in practically every area, service was better in 1971 than it was in 1970, still better by the close of

1972 and considerably better by mid-year, 1973. The number of weak spots has been cut down significantly in the past three years. And, while we're not completely out of the woods in all locations, we're certainly seeing sunlight flickering through the leaves, even in the most troublesome areas."

In assessing the quality of service, the 75-area report analyzes 11 categories, touching on such things as backlog of unfilled orders; meeting installation dates; the speed with which operators provide toll and assistance services; speed of providing dial tone; the functioning of inward and outward DDD equipment; the need for equipment repairs, and customer reports of dissatisfaction with the performance of telephone plant or telephone employees. When service falls below a specified standard in any one of the 11 categories during the month, the area is charged with "weak" performance in that category and it shows up on the report as a "weak spot." The measurements vary from category to category, of course, and one "weak spot" is by no means to be construed as one customer complaint or one isolated failure. An area that fell below standard in each of the categories would show 11 weak spots for the month; if this substandard service continued for the whole year, the area would be charged with 132 weak spots.

Danger in generalizing

There were only 395 weak spots in the entire Bell System in 1970. By the end of 1972, conditions improved and the number was down to 240. At mid-year, 1973, there were only 68 weak spots, just about half the number registered at that time the previous year. On the average, Bell System service has picked up substantially. But there is a danger in generalizing, as Mr. Greber points out:

"I get a little nervous when people start talking about averages. The fact that Bell System service *on the average* is better isn't much comfort to people living in the few areas where service doesn't measure up to the standards of excellence we've taught our customers to expect. We've had some dramatic improvements but, sadly, we've slipped in places, too."

New York Telephone Company, probably the hardest hit, the most widely criticized and highly publicized of the companies experiencing difficulties a couple of years ago, can take justifiable pride in returning service to its previous high standards. Where the company could identify 125 weak spots in service throughout New York State in 1970, by the end of 1972, weak spots were down to 22. In the first six months of 1973 the New York company registered only one weak spot, and that one in the Brooklyn-Queens area.

Service is back

Brooklyn-Queens is New York Telephone Company's second largest operating area in terms of number of telephones served. At the end of 1972, more than 2,800,000 telephones were in operation there—more phones, by the way, than in the states of Maine, New Hampshire, Rhode Island, Vermont, Nebraska and North and South Dakota combined. Yet this large body of customers got dial tone within three seconds 99 per cent of the time; toll and assistance operators responded within 10 seconds more than 90 per cent of the time; and DDD equipment operated without trouble 97 per cent of the time.

Both Brooklyn-Queens and Manhattan had a large backlog of installation requests going into the spring of 1972 because of a seven-month strike. By the start of the summer, 99 per cent of the backlog had been eliminated. Based on this and similar evidence, few would argue with New York Telephone's president, Bill Ellinghaus, when he said of the company's service, "We're back!"

On the other hand, if there is any question as to the effect that earnings have on a company's ability to provide good service, one need only examine the situation at Pacific Telephone and Telegraph Company. According to the 75-area report, the number of weak spots plaguing that company tripled last year.

In 1972, Pacific's rates were rolled back some $143 million annually and the company was compelled to refund some $175 million by order of the California Supreme Court. Subsequent action by the California Public Utility Commission restored some of the rolled-back rates, but still left Pacific short of its authorized rate of return, currently set at 7.85 per cent.

Pacific has been caught in the vise of growing demand for its service, the need for heavy construction expenditures – financed with ever-more expensive borrowed dollars – rising operating costs and an unrealistically low rate of return on its investment.

There are now 11.4 million telephones in service at the Pacific company and the current prediction is that another 1.5 million will be added to the California network by 1975. Not only is the number of phones increasing, but in the past 10 years calling volumes have increased 167 per cent. You need an awful lot of plant to take care of that kind of growth. Pacific soon expects its construction costs to reach a billion dollars a year.

It's a fact of life that the telephone industry must raise money on the outside in order to function. It's been impossible to generate, solely within the business, the enormous sums needed each year to provide proper service. Pacific, like other telephone companies, has had to turn to the debt market to meet its construction costs. In 1967, Pacific's debt ratio on total capitalization was 38 per cent. In 1972, it was 48.5 per cent. This means that while interest on long-term debt cost the company $52 million in 1967, it was $135 million last year. All other costs of doing business rose similarly.

Pacific's earnings are low

In return, Pacific earned about 6.7 per cent on its California operations last year. That's just slightly more than a small investor earns for putting his money into a time-savings account, and the negligible risk there is protected by Federal insurance. Pacific has not been able to raise its dividend in more than 10 years; its stock is now selling at below book value; and its bonds recently were downgraded from AAA to AA by Standard and Poors.

What has this meant in terms of Pacific's ability to do the service job in California? It's obviously made it extremely difficult. When profits are squeezed, a company does everything it can to reduce expenses. Instead of shooting for superlative service, Pacific's goal has been to keep service from falling too far below minimum acceptable standards. But when you put a freeze on promotion to and within management, freeze hiring and overtime, and limit maintenance to only those things which need doing immediately, as Pacific had to do for a time, service is bound to be affected.

Pacific's struggle

Pacific is faced with one of the most difficult fights a phone company has had to face in recent years. It continues to call on all the competence and dedication its employees can muster to provide the best possible service while the struggle for reasonable earnings goes on.

Other areas of the country have also been exposed to similar growth problems. Such sudden surges often temporarily affect service while the company hustles to provide the equipment needed to meet the larger demand. The state of Florida is a case in point. Contributing to its phenomenal growth have been such diverse factors as a large and rapid influx of Cuban refugees into the Miami area, a growing desire by large numbers of people to make their retirement homes in the state, coupled with a vigorous tourist industry that annually seems to draw record-breaking numbers of people.

More than 1,130,000 of the three million Bell System Florida telephones are located in Southern Florida, primarily in the Miami-Miami Beach-Dade County area. In 1970, Southern Bell could identify 26 weak spots plaguing company service in Southern Florida; by the end of 1971, that number was cut by more than half, and last year, weak spots were down to zero; a record maintained through the first six months of this year.

Customers were quick to note the improved service. According to Telephone Service Attitude Measurement (TELSAM) customer opinion surveys, taken in Southern Florida, the number of respondents rating contacts with the business office "good to excellent" grew from 81 per cent in 1972 to 88 per cent in 1973. Part of that improvement can be traced to a step taken by Southern Bell to better communicate with Miami's large Spanish-speaking population. In July, 1971, the company set up a bureau to act as an intermediary between Spanish-speaking subscribers and the business offices serving them. The bureau now handles several thousand customer contacts each week.

Southern Florida customers also gave the telephone company high marks in other service categories. Ninety-one per cent of those interviewed said installation service was good to excellent, 90 per cent said operators provided excellent service, and 81 per cent of the customers said that they were completely satisfied with the speed and quality of repairs when they were needed.

Currently, TELSAM surveys are being conducted in all or part of 15 telephone companies. Generally, the TELSAM results closely match the findings of the 75-area report, with customer comments most favorable in the companies showing the fewest service weak spots. In 1974 the Bell System hopes to be taking TELSAM surveys in almost all of the territory in which the companies operate. It is through such customer opinion surveys that we can gauge how well we're doing from the customers' point of view, or in other words, the kind of reputation we enjoy.

A reputation for service

Mr. Greber puts it this way: "Our reputation is one of our most valuable assets. When we fall short in some areas, and don't give the service our customers expect, our reputation suffers. And no amount of advertising, public relations or explanations of why we've fallen down will cover up for a poor service job. We have enjoyed a reputation for superior service and we mean to maintain it!"

According to the 75-area report, the New Jersey, Pennsylvania, Chesapeake and Potomac, Ohio, Michigan, Indiana, Wisconsin, Illinois, Northwestern, Pacific Northwest, Southwestern, Southern New England and Cincinnati companies, which had very few weak spots to begin with, now have even those nominal problems well under control. Some of the major operating areas which incorporate cities such as Detroit, Indianapolis, Kansas City, Little Rock, Minneapolis, Philadelphia, and Seattle are providing service of such high calibre that not a single weak spot was registered for them for 18 consecutive months ending June, 1973.

Bridging troubled waters

The 75-area report does show, however, that at the end of 1972, trouble spots continued to exist in such places as Atlanta, Boston, Denver and Houston. If capital expenditures can help to solve these problems, the respective operating companies have faced up to their responsibilities: for the year 1973, the companies budgeted for construction purposes $163 million in Atlanta, $146 million in Boston, $115 million in Denver and $144 million in Houston. The new construction caused a dramatic improvement in Denver's service by mid-1973, and a noticeable improvement in Boston.

Good telephone service does indeed require good equipment, but technical equipment alone is not the key to the success or failure of this business. It's been said so many times before it's become a cliché, but it's still true–*people* are the heart and soul of this company, not machines. More than a million people, men and women, bring their diversified skills and personalities to bear and make their respective contributions to the common effort of providing top quality service to customers. Over the past few years, a good many of these people have gone the extra mile to restore service to its previous high standards.

As Chairman deButts said a year ago, ". . . on the basis of the quality of telephone service most Americans enjoy today–but more particularly on the basis of the job that is being done to fix service wherever it needs fixing–you and I need not feel anything but proud for being telephone people." ☐

New Seven-League Boots

The millimeter waveguide comes out of the laboratory to help carry our mounting millions of calls

Around the middle of last April, AT&T Chairman John deButts was reporting to the shareowners at their annual meeting in Chicago. Among the new Bell System developments he described was a transmission medium called the millimeter waveguide. The waveguide, to be sure, had been known and publicized for many years, but now there was a significant difference in the Chairman's report.

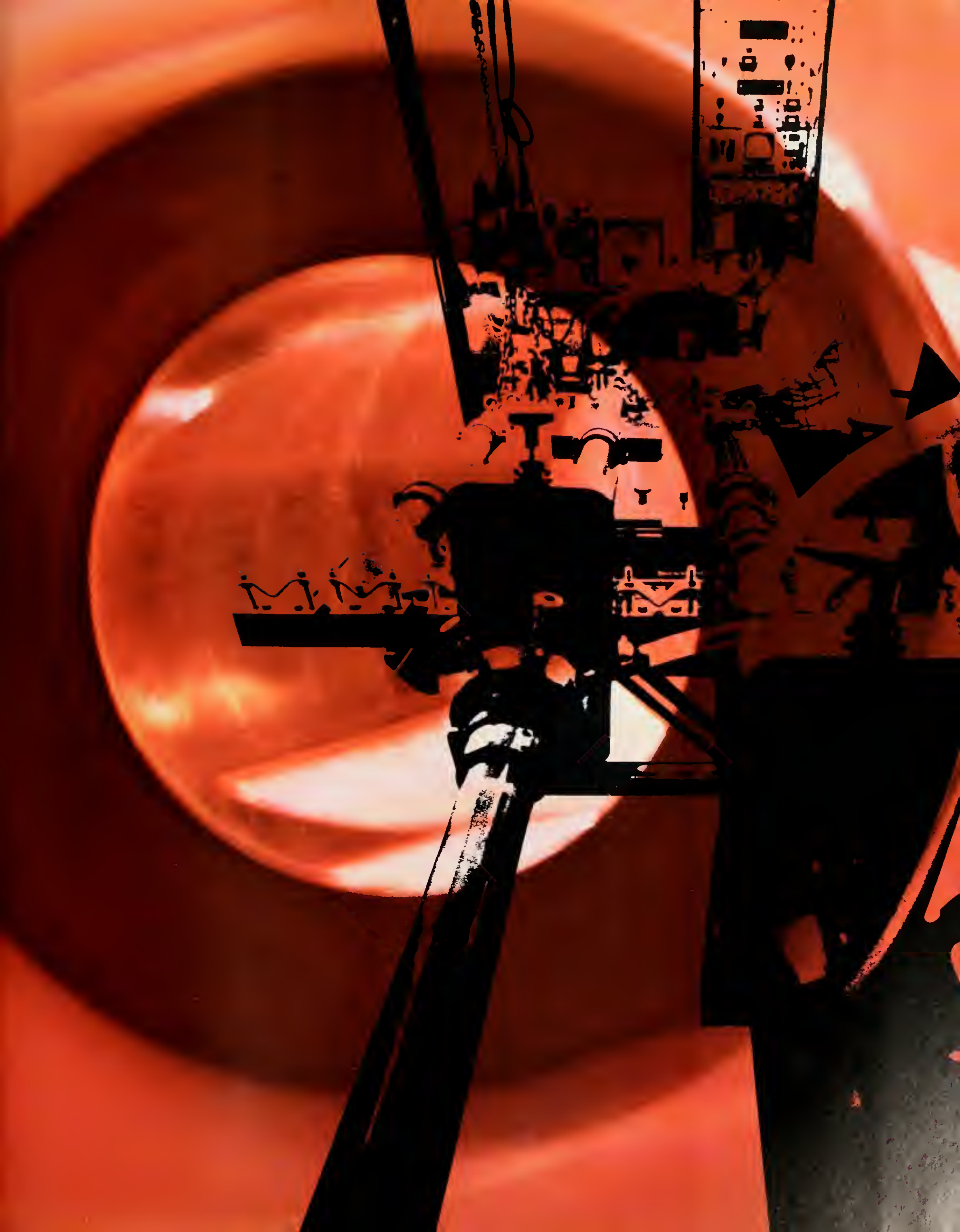
"What makes the millimeter waveguide news today," said Mr. deButts, "is that what until now has been a laboratory experiment is on its way to becoming an operational reality. We are now ready to build in New Jersey a 20-mile section of the new system that, when it is completed, will be used for field evaluation. If the evaluation confirms our expectations—and we are confident it will—we will apply for permission to construct a commercial system between New York and Philadelphia for service in 1979. As we move into the 1980s, I anticipate that we will be installing millimeter waveguide systems along many of the nation's busiest communications corridors."

The fact that these corridors are so busy, and that, indeed, long distance calling throughout the nation is growing at the rate of 11 to 12 per cent a year, has constituted the practical impetus for bringing the waveguide out of the laboratory. The first new physical transmission medium to be introduced to the world in a third of a century, the guide is essentially a precisely dimensioned metal tube about 2½ inches in diameter, coated with copper and polyethylene, cushioned with a compliant support, encased in an outer steel sheath and finally buried four feet underground. It is deceptively simple in appearance, but it is the end result of decades of research and experiment, and, with the present and future need for circuits, its tremendous capacity vindicates all the effort.

In the controlled atmosphere of the waveguide's hollow tube, communications will be carried on radio waves only a few millimeters long—thus the origin of the name millimeter waveguide. These waves are about one-tenth the length of those used for microwave radio transmission, and the band of frequencies used in the new system will be broader than all of the presently used lower radio frequencies combined. The tiny waves make the tube capable of carrying a quarter of a million telephone conversations at one time, or a mixture of voice, data and television signals. With certain modifications, that capacity can ultimately be stretched to 460,000 simultaneous phone calls—about four times the number todays most advanced coaxial cable system can carry.

Such high-capacity communications through waveguides has been waiting in the wings, so to speak, for many years. For the waveguide did not come about by chance; it has a history at Bell Laboratories dating back to the early 1930's. Since George Southworth did his pioneering work with water-filled pipes in 1931, research has gone on continuously, sometimes involving many people, sometimes a few, but always with new people contributing new ideas and viewpoints, accumulating a vast store of knowledge and techniques over the years.

In the early days of experiment it was known that, normally, transmission losses increase with higher frequencies for waves traveling through a waveguide in most spatial patterns, or modes. These losses occur because waves in certain patterns induce large electrical currents in waveguide walls. At higher frequencies, such wall currents are confined to thinner and thinner sections of the waveguide's copper lining. This so-called "skin effect" causes energy loss through heat. Mathematician Sergei Schelkunoff, whose work paralleled in theory the experimental work of Southworth and others, discovered the low-loss "circular electric" mode on which the millimeter waveguide system



depends. Waves in this low-loss mode have circular lines of electric intensity that are concentrated toward the center of the waveguide. In fact, the wave travels with an electric field of almost zero along the waveguide's inner wall.

This means that there are low wall currents and low heat losses. And, as the frequency increases with shorter wavelengths, these wall currents decrease still further. At the same time, because of the skin effect, the portion of the waveguide's copper lining available to carry these currents also decreases. But the currents themselves decrease more rapidly than the effective thickness of the lining, so the net transmission losses drop still lower as the freqency increases.

To achieve this theoretical low loss requires a geometrically perfect waveguide. Imperfections in the waveguide geometry excite undesired electromagnetic spatial patterns, or modes, which cause a loss of energy called "mode conversion loss." The mechanical perfection of the guide, then, governs the overall loss which can really be achieved.

All of this was predicted by a theoretical mathematician, confirmed in experiment and is now to be put into practice. The waveguide story consists of what Mr. deButts called "hundreds and thousands of patiently achieved advances, most of them unheralded."

Transistor technology essential

One, however, although not heralded loudly at its advent, has long since been identified as one of the great scientific breakthroughs of all time and the progenitor of whole new industries. From the earliest days of radio, the vacuum tube was the vital heart of oscillators that generated radio waves. But, during the 1930's, forward-looking engineers realized that the electron tube had been perfected almost to its natural limits. Highly refined as it had become, it was wasteful of power, generated heat, was expensive to make, was fragile and failure-prone. After World War II ended, Bell Laboratories scientists revitalized research that had been carried on sporadically years before but that now became the subject of organized investigation: the study of semicon-

ductor crystals. This concerted effort produced, in a relatively short time, a device that for nearly a quarter of a century has been a household word: the transistor. The diminutive successor to the vacuum tube has in turn spawned a vast family of solid state devices, among them diodes developed at Bell Laboratories which can generate radio waves at extremely high frequencies—the millimeter waves needed for a waveguide. Indeed, the system as it now comes out of the laboratory is based almost entirely on solid state devices and technology.

Waveguide utilizes PCM

This technology includes the transmission technique known as pulse code modulation with regenerative repeaters. PCM was chosen for use with the waveguide for three principal reasons: it is a rugged modulation technique, relatively unaffected by undesired modes in systems like waveguide; it is well suited to intermixing voice, computer data, Picturephone or television signals; and it can be designed to provide great accuracy in the overall transmission process with less than one error per billion pulses in going from one repeater to the next.

In operation, both digital and analog information from coaxial or microwave systems will be adapted for waveguide transmission. This will involve special PCM encoders for converting analog signals to a pulse, or digital, format, and methods for combining several lower-speed pulse streams into a single high-speed pulse stream.

At points where waveguide signals must be regenerated to compensate for energy loss over distance, a complex filtering technique will divide the millimeter waves into 120 component broadband channels (corresponding to 57 two-way message channels and three spares). Each of the 120 channels will deliver a 274 million-pulse-per-second stream to a separate repeater in a repeater station. After amplification and regeneration, the pulse stream will be recombined by another set of filters and sent into the waveguide toward the next repeater station. These repeaters needed to amplify and regenerate the pulses can be spaced as far as 25 miles apart, compared with present coaxial cables which must have repeaters every two or four miles.

From WE: the perfect pipe

Such advantageous spacing of repeaters is a result of high precision in manufacturing the tube itself. And such precision, in turn, results from long and painstaking effort both in Bell Laboratories and in Western Electric. To turn the millimeter waveguide from a scientific curiosity into practical reality, Western's manufacturing research engineers began working with their Laboratories counterparts very early in the development of the system. William Warters, director of the millimeter waveguide system laboratory at Bell Laboratories, points out that Western Electric also worked closely with steel manufacturers to help develop techniques for making tubing of amazing geometric perfection.

"The imperfections which govern the mode conversion loss have been reduced to such an extent that we can go to a larger guide to achieve an overall lower loss," he says. It is this lower loss in energy of the signal as it travels through the tube that makes possible much wider spacing of repeaters than had originally been expected. "Our progress," says Warters, "has been mostly in engineering breakthroughs in achieving a practical system. Because we've been researching waveguide since the 1930's, we had a very good understanding of the system's scientific phenomena before going into the project. We were able to start right in on engineering problems."

One of those problems, obviously, entails maintaining the high precision of the system once it's buried in the ground. But, with development of the compliant cushioning and its outer steel sheath, the waveguide has proved to be much more rugged than earlier designs had indicated. "We used to worry about using special equipment such as laser-controlled trenchers to provide a smooth bottom in the trench," Warters recalls. "Now, we don't. We can place the steel waveguide and sheath structure directly in an ordinary trench bottom in normal soil." The armored tube has great mechanical strength. In an experiment with the guide alone, minus its protecting sheath, a force of 17,000 pounds was needed to crush the tube in half. Such a dent adds about three decibels to the transmission loss.

Most of the waveguide will have a thin dielectric lining which reduces signal loss as the tube curves around bends along its route. "Our earlier figures," says Warters, "predicted curves with a minimum radius of 400 feet, and that limited the number of bends that could be allowed on a route." Now, he affirms, engineers planning the waveguide's route can specify curves with a radius as tight as 250 feet, and that figure is set by the sheath's mechanical properties, not by the guide's electrical performance. Further, this means that as much as 40 per cent of any given route can be in curves without having to decrease repeater spacing. "In effect," says Warters, "the route bend problem has been solved. People can now go out and engineer waveguide routes following very reasonable rules."

Resolving an old problem

The exact parameters of these rules will be among the problems to be defined during the field evaluation in New Jersey. Because the waveguide does not beam its signals from tower to tower through the air as does the microwave network, but must be ploughed into the physical geography of the countryside, the system may have to surmount some property problems along rights-of-way. The Bell System, however, has been dealing with such problems almost since its basic invention came out of the founder's attic in Boston; they are not much different from those the System has encountered for a long time in installing cables and wires in populated areas.

In any case, throughout the country, the millimeter waveguide will grow as a working part of the nationwide network. Communications needs have grown to the point where the waveguide system's high capacity has made it commercially attractive to provide better service at lower cost.

Its time of waiting in the wings has ended.

Don Woodford, Managing Editor

To Err is Human- Or is It?

If an installer's husky, 6-foot son told him at the supper table last night that he'd rather be a pastry chef than a linebacker, there is a strong possibility the installer will make an error on the job today.

Or if the mortgage payment didn't get out on time, or if the boss has been critical, or if his daughter has declared that she wants a "pad" of her own, it is again a little bit more likely, statistics indicate, that the installer could make an error.

Installers aren't alone in such frailties, of course; personal factors affect the job performance of any individual. In fact, statistics gathered through testing and performance observation indicate that about 50 per cent of on-the-job errors can be attributed to personal factors.

The latter is the finding of Robert W. Bailey, research psychologist with Bell Laboratories, based on his own work and the accumulated reports of others in and out of the Bell System–particularly aerospace industries and the armed services. Bailey is a member of the technical staff of the Human Performance Technology Center–Personnel Subsystem Department at the Labs' Raritan River Center.

In his work, Bailey has found that personal factors–and six other identifiable factors–have profound impact on performance, with a concomitant impact on cost. Because of this cost-performance relationship, Bailey's work and the work of his associates have risen to new importance. Putting a price tag on error rates that, up to now, have been considered acceptable (as long as the job task to be performed was completed), has attracted the interest of managers across the System.

"The annual cost of correcting errors that could adversely affect service has been placed in the millions," Bailey reports. But, in his opinion, even the hefty figures reported are conservative. "If we were to perform equipment inventories and record 'reconciliations' in one operating company alone, the cost would likely reach the millions. In other words, just to go in and clean up all the records until they looked exactly like the physical plant, or accurately represented real conditions, would cost that kind of money.

"Furthermore, because the operating companies usually don't change procedures when they clean up their records, you could probably repeat this process every three to five years. If each company decided tomorrow to totally purge its records, the cost would be in the hundreds of millions – and that's just to make the records accurate."

In another study, Bailey tried to isolate an actual cost-per-error. He located a report by one operating company in which it concluded that the annual cost of correcting service order errors came to $193,000. Based on the number of errors corrected, the average cost to correct one error amounted to $3.50.

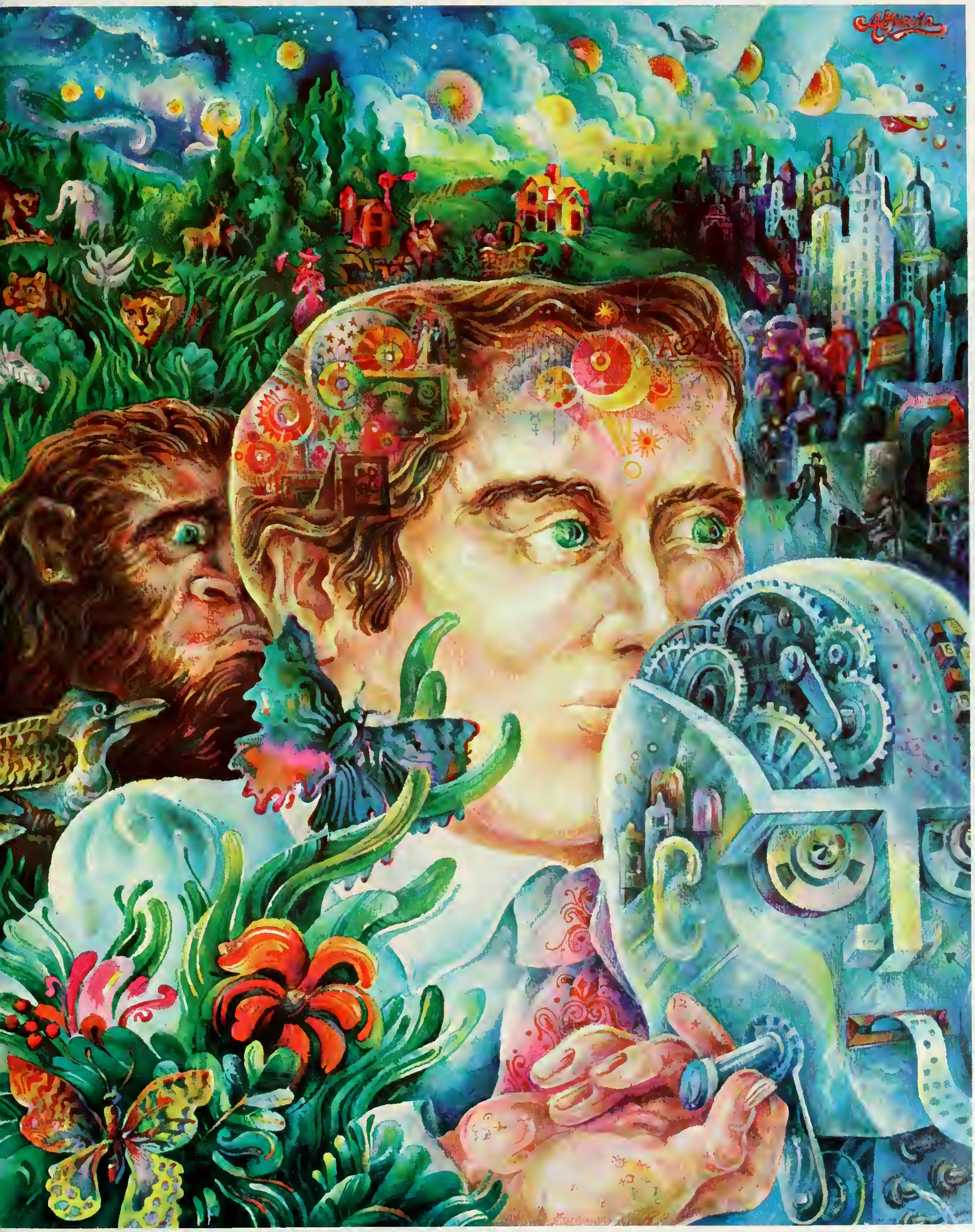
On top of the $3.50, the peripheral correction process, such as correcting associated errors and calling the customer to check or verify updated records, was estimated to cost an additional $3.75. That gives a total per-error cost of $7.25.

"If you start looking at *each* error as costing over $7.00, instead of accepting it as part of getting the job done, then the error problem is brought into sharper perspective," Bailey notes. "Keep in mind, too, that this cost includes only those activities related to correcting errors. There's also a major expense involved in *detecting* errors, especially if you're using a million-dollar computer to do it."

Figures like these tend to grab expense-conscious imaginations, with the result that Bailey is spending increasingly greater amounts of time acting as a consultant to managers who are anxious to cut spiraling costs, especially in expensive computer systems. But costly errors are not limited to computer systems. Certain critical classes of operating errors can cost as much as $500 *just to report on what exactly happened.*

Through his work as an error diagnostician, particularly in data systems, Bailey has been able to corroborate his findings that there are seven major factors that cause error. He has dubbed his diagnostic approach the "causal factor" method of error control.

"If I go into a data system that is



> **“We just can’t tell a boss to give his worker the day off because biorythm cycles indicate that he’ll probably make an error.”**

sick—and it’s sick because it’s costing $100,000 a year more than was expected, and taking 50 instead of the expected 20 people to run it—I start looking to see what’s behind the inefficiency. What I find is that the seven major causal factors tend to be identifiable — they’re present, deteriorating the performance.

“But what’s more interesting—at least from the standpoint of the work we’re doing here—is that the factors tend to remain pretty consistent, statistically, in their appearance in ‘sick’ systems.”

Ranked in order of most frequent cause of errors to least, the seven factors are: personal factors, system design factors, documentation factors, training factors, source data factors, man-machine interface factors, and environmental factors.

Bailey defines the seven as follows:

Personal factors. Perhaps the most complex and elusive causes of human error. Those traits, characteristics or conditions peculiar to the organismic nature of man that affect, in a relatively consistent manner, his ability to perform efficiently. These include physiological and psychological variables which are part of the human nature of man; e.g.; age, sex, psychological and physiological needs. These variables cannot be removed from a system or work situation unless the human component is replaced by a mechanical one. Where humans are an essential part of a system, the long-range objective is to identify the effect of each causal factor on human performance and to find the conditions within each causal factor where human reliability is optimized. This determination is very difficult in view of the fact that some subfactors are discrete (e.g. sex), some are continuous (e.g. age) and still others are hardly quantifiable at all (e.g. motivation).

System design factors. This includes any overall system design condition that may ultimately reduce the reliability of the human component, and encompasses all conditions which do not help complete manual activities in an acceptable time frame and with no errors. This causal factor could include such elements as not permitting sufficient time to complete a task, or not giving proper feedback on performance.

Documentation factors. In order to communicate modes of operation to the system operators, a complete documentation package must be prepared. That is, in order for the system operator to know exactly what he is to do to help meet stipulated objectives, descriptive documentation must be prepared and made available to the operator. This documentation must be prepared in a way and at a level the reader can understand. This is especially true in cases where there is a high turnover of employees on a job or when continual help must be sought to perform the job correctly.

Training factors. In addition to documentation, training is a commonly used way of communicating to employees what they must know and be able to do. The system may be well designed and adequately documented, but if the employees are not taught exactly what they are to do and how best to do it, then the probability of error is high. Properly designed training will include examples, case problems, and, if possible, work simulation. When formal training is completed, supervisors should sample new employees’ performance for adequacy and accuracy and offer coaching as necessary.

Source data factors. This refers to those items which tend to degrade the human’s ability to process information accurately, such as protracted codes or illegible handprinting. Source data studies have typically focused on optimizing the use of hand-printed, typed, or CRT (cathode ray tube) characters — both numbers and letters. This factor is especially critical in computer-based information systems.

Man-machine interface. This concerns how well the equipment is designed for human use. Is the desk high enough? Is the chair comfortable? Is the work station efficiently laid out? Is the keyboard designed for ease and speed? Are the knobs and buttons clearly identified and within reach? Is the CRT display clear and uncrowded? The technology which deals with these questions is generally known as luman Engineering or Ergonomics.

Environmental factors. These are
onditions that affect the "world" or
life space" of a worker—which, in
urn, affect the accuracy of per-
ormance. Some of these conditions
nclude fluctuations in room tem-
erature, other employees passing
ack and forth in front of a work
tation, and noise. Noise appears to
egrade human performance more
han any other sensory stimulus.
ignificant decreases in reliable
erformance have been noted
here the noise level exceeds 60 to
) decibels and approaches 100 dec-
els. Unexpected or intermittent
oises are most disturbing. Activi-
es that are of a complex nature or
hat require close attention are par-
cularly sensitive to noise.

"If we were to go into a system
nd optimize conditions related to
ystem design, documentation,
aining, source data, man-machine
nterface, and environment, we
ould probably still have half the
rors left," Bailey explains. "Half
e error rate seems to be related
ght back to people factors."

Candidly, Bailey admits that
arning how to perfect those elu-
ve psychological and physiologi-
l conditions that affect people
ill require more research effort,
nd cooperation from both man-
gement and non-management.
ven when the nature and effect of
l of the personal factors is under-
ood, however, it probably cannot
e controlled. The best that can be
ped for is awareness that they
e present, and a focus on efficient-
controlling and correcting the re-
lting errors. "We just can't tell a
ss to give his worker the day off
ecause biorythm cycles indicate
at he'll probably make an error."

Biorythm, Bailey explains, con-
rns physical, intellectual, and
notional cycles. It suggests that
ch person experiences natural cy-
es that run over longer periods
an 24 hours. The duration of the
ysical cycle is about 23 days, the
notional cycle 28 days, and the in-
lectual cycle is about 33 days. The
obability that errors will occur is
ghest when the critical points for
. cycles occur at about the same
ne. Several organizations such as
e University of Minnesota Medi-
l School, Stanford University
School of Medicine, and Humboldt University in Berlin have in the past explored, or are presently exploring, the effect of these cycles on human performance.

"How are you going to deal with the conditions?" Bailey asks. "We can't control the cycles, but we have to learn to contend with them as we start to look more closely at the personal factors in the causes of error.

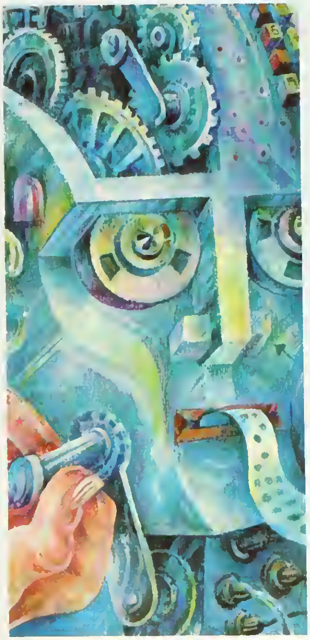
"Physiological needs must be considered. Humans get hungry, thirsty and tired; they require food, water and rest.

"The psychological and physiological sources of error are difficult to identify, but we are going to do more work in the hope that we will not only be able to identify them but quantify them, as well—that is, see if we can get at the fault-causing mechanism, get to see the interaction of the various factors. But I'm afraid we're not at the point where we can set up objective formulas that describe in some quantitative manner these interactions and how they are responsible for error."

In the meantime, at least 50 per cent of the causes of error—those other than personal factors—can be attacked. William F. Fox, head of the Personnel Subsystem Department, finds satisfaction in being able to apply this usable knowledge to systems design right now. "This whole area of personal factors is nebulous," Fox comments. "It is becoming clearer, that's true, but the other half of the error problem we can address ourselves to immediately—such as training, documentation, and the other non-personal factors. We know how to develop high-quality training. We know how to design so that we maximize the quality of human involvement in a system. We know how to lay out a console or a printed form so that it's maximally usable.

"So, the key, by and large, is to use immediately the knowledge we have, which we're not using today and, in the meantime, try to get a better handle on these more nebulous areas, such as biorythm. If we deal with the things we know how to deal with, if we know where we are going to make errors, and if we try to maximize the efficiency of

> “Too many times in the past, humans have been forced to adapt to systems. Our position is that during design, systems must be made to adapt to people.”



correcting those errors, then we have made a significant contribution.”

Making that contribution requires that design engineers be cognizant of the implications for human error in the systems they design. Simply stated, this means that because engineers are people, they consider themselves experts on what people will need in a given system. On the surface it seems a logical assumption.

Says Fox, “It’s a natural assumption. I recall an engineer once who was measuring the desk he sat at with a ruler. I asked him why he was measuring. He said he was designing a console. He said he was comfortable with the height of his desk, so he was going to make the console that high.”

The problem with this well-intentioned approach to designing is obvious. When the system arrives at the location and its users make too many errors, then the people must be adjusted to improve the system, or the system must be redesigned to make up for whatever fell out during the design phase.

“What we’re most concerned with is that design decisions go beyond the engineering concerns. They must include job performance needs, job requirements, people needs that go beyond the obvious requirements—like where to put the knobs so they’re within easy reach, or the lights so they can be seen. In short, a lot more information is required for the design process than engineering criteria alone. Without this information, the end product is happenstance, not design.”

Correcting design errors after the system has been installed is expensive. According to Fox, Air Force studies have found that it costs three times as much to “retrofit” an operational system as it would have cost if the problems were taken care of during the design phase.

“That is, if they spend three dollars to fix it, they could have taken care of it in design for one dollar,” Fox notes.

“So you get socked two ways. You get socked with the inefficiencies in operation that come about with poor design. And when you find out that your error rate is so intolerable that you have to fix it, you get socked with three times what it would have cost you to have done it right to begin with.”

Not too surprisingly, Fox reports that there is often resistence to this approach. “Some people, especially the more humanistically oriented behavioral scientists and some system designers, have serious reservations when first exposed to this approach. The initial reaction often is that we are describing a kind of neo-Taylorism (F. W. Taylor was the father of Industrial Engineering) which treats people as cogs in a great machine without regard for the subjective quality of their work. However, once they fully understand what we are doing, they usually agree that their human concerns and our system performance concerns are mutually supportive and, in fact, may be mutually dependent.

“Too many times in the past, humans have been forced to adapt to systems. Our position is that during design, systems must be made to adapt to people. The hoped-for result is an operational entity in which human and mechanical or software operations are integrated and complementary.

“To my knowledge, there is nothing satisfying about inadequate training, unreadable displays, poor or nonexistent documentation, awkward procedures, or uncomfortable work space. In fact, the same characteristics which contribute to error-free work—such as wholeness of the job task, and frequent and useful feedback to the worker—also are vital to satisfying work. And these are not just our opinions. We have had many discussions of this with Bob Ford, who has done so much to improve work quality in the Bell System, and there is full agreement that our approaches are not in conflict.” [Dr. Ford is AT&T’s director, Work Organization and Environmental Research.]

Setting a computer right, let alone a complete system, can be costly and time consuming. Researchers on Fox’s staff have found that it is much easier to deal with errors in a manual file. “The reason for this,” says Bailey, “is that you can get in and manually erase and add information in a manual system. But when dealing with a computer that spits out bad information, you have to find out why. In some systems there is no ready access to the file to see what the computer is basing a wrong response on—and then it's compounded by making any error correction procedure very complicated. To get in, you have to put down the error number, and you have to somehow address it so that it can get into the appropriate area in the data base. Often, during this procedure, more errors are made. It becomes a circular problem."

Neither Fox nor Bailey would advocate doing away with computers. Both agree that the computer's sheer speed and ability to perform complex operations are necessary for the continuing success of the business.

And, having none of the physiological or psychological problems of humans, computers are in many ways easier to deal with. Used properly, they get the job done fast and accurately.

Ironically, it is the computer's speed that has set up what Bailey considers a major problem. Because they can outproduce humans on most clerical tasks, computer-based systems are designed with what is commonly known as the "acceptable error rate." This means that the error rate is so small, compared with the computer's prodigious outputs, that the error rate is forgiveable.

Bailey argues against this assumption. In a paper he co-authored with his associates, Stephen T. Demers and Allen I. Lebowitz, he has this to say: "Most investigations of human reliability have utilized an 'error rate' approach where the emphasis is on uncovering a supposedly fixed level of human unreliability associated with a variety of manual activities; e.g., keypunching, coding and calculating. This error-rate approach is based on the acceptance of a certain amount of human error as being inevitable, and has resulted in a research emphasis that is oriented toward predicting the human's contribution to *system degradation*. Unfortunately, not enough attention has been paid to the numerous factors which give rise to these errors or to the possibility that perhaps most all of the errors could be prevented.

"The growing body of literature on error rates for clerical tasks reports a host of reliability coefficients associated with each activity . . . perhaps (as a result of studies done in this area) business information system designers have emphasized the development of methods for detecting and correcting human errors rather than for preventing human errors. The present flurry of so-called 'error control' activities actually offers little help in understanding how to keep errors from occuring in the first place."

Bailey admits his position is controversial. Whether or not humans are error prone, he sees as an open question. "It used to be that, if you agreed with the error-prone theory, you were on the right side. Then, some researchers came up with the opposite theory. Right now the question is unsettled, so you can agree with either side without being ostracized.

"I've taken the position that the human is basically error-free. I feel that if we optimize all conditions, the human will operate without error. All we've got to do is identify the forces at work."

Bailey's position is a strong one. It raises eyebrows even among his colleagues who, no doubt exercising due scientific caution, would qualify Bailey's hypothesis with a "possibly."

To Bailey, though, it only remains to be shown. "No one has ever done a study that demonstrated the lowest possible level of error that humans can make. In other words, no one has ever set up an experiment in which the seven casual factors were not operating to cause errors. I believe it would show that most of our behavior is error-free.

"In fact," he adds, "one of the reasons more research hasn't been done is because the behavior of most humans is on the order of 95 to 97 per cent error-free. We do things right most of the time. So we're really only talking about three or four per cent of the time, which makes it difficult to set up a laboratory experiment. Most of the data you collect will be worthless. What you want is the tiny percentage of information concerning those times that errors are committed.

"I think the question we should be asking ourselves is: how important is it not to have things fail? When it comes to errors, we've tended to look the other way. Errors are something we've tended to accept, because we can handle them. If you take the position that the human is going to make errors, then you have to accept the errors that humans make.

"And not only have errors been acceptable; it's been acceptable to put together a staff of people to correct these errors. That is what is happening in many of our computer systems. We tend to rush the data into the computer systems, and at the same time we build up a large error-correction force to take care of the errors the input people are making.

"There's a tremendous amount of individual differences; what may be a standard that one person can meet, may not equal the standard that another can meet with the same minimum amount of error. We don't usually ask ourselves: how fast should we do it so that the person makes no errors. We ask: how fast should the person do the work so we can get a certain amount done in a certain time with a certain error rate? We accept error. And the question I ask is, why?

"Now there is a point at which the cost to the company to reduce the number of errors is greater than the cost to correct the errors that are made. In other words, it's conceivable that you could spend more money trying to make your environment error-free than it would cost you to have a few correctible errors. But that should not impede us from asking ourselves: how important is it not to have the human fail? Most of us are conditioned to think that the human is going to fail no matter what we do. Consequently, we approach many jobs prepared to correct errors.

"I think that's the wrong approach. I think it's more important not to have the human fail in the first place . . . and that's just about where my theory is."

Edward J. Swartz, Associate Editor

To Ramon S. Scruggs, Sr. for Corporate Excellence . . .

Those are the opening words of the first annual Whitney M. Young, Jr. Corporate Excellence Award, 1973. The dedication continues: "For excellence in achieving affirmative action; for best symbolizing the persuasive and perceptive role that Whitney Moore Young, Jr. deemed necessary for black executives in industry to aspire toward for the good of all in this nation."

Early next year, Ramon Scruggs will close out a telephone career that not only spans more than a third of a century, but that has helped enlarge, perhaps immeasurably, the human dimensions of this business. Hired in 1939, "Ray" Scruggs became the first black man ever to fill a management post in the Michigan Bell Telephone Company, an event then considered of such significance that the Michigan Chronicle, *a newspaper serving Detroit's black community, greeted it with a red-letter headline.*

At a time when most companies in the country had not yet ventured into the employment of black people—except in menial positions—being the first to represent the breakthrough carried with it a special set of problems and frustrations. As might be expected, Ray Scruggs experienced both overt and covert expressions of hostility and prejudice. And there was the pressure, too, from the black community to "do right and make good" so that others, in time, could follow.

The story of his struggle to "do right and make good," to retain his individuality and dignity while working in an environment that had not yet conceded these things as unarguable rights, is a story that should be told. It should be told if for no other reason than as an encouraging reminder of what one man's determination can accomplish, and of how vast a social change has occurred in just one generation. It is not just one man's story, and it does not suggest that everything has been finally achieved, but it does reveal how much has *been done, and how much* can *be done.*

At a recent speaking engagement, AT&T's Minority Affairs Director Ramon S. Scruggs, told the audience that he was currently more optimistic about improved conditions and employment opportunities for minorities in this country than he had ever been in his life.

"I know there's a danger in voicing such a sentiment," he said. "Whenever any member of the black community publicly expresses any sort of optimism, there are those among his black brothers and sisters who will jump up to accuse him of being a traitor to his black identity and ignorant of the many pressing problems still facing blacks today. But I'll take that risk and tell you that there are more and more objective signs of positive change in the wind. Not only that, but I can report to you that there are more man hours and more resources being directed toward the solutions of minority problems in this country than anyone would have dreamed of ten, or even five years ago."

If anyone is qualified to assess the situation, it's Ray Scruggs. Not only because it's his job to keep track of such things, but because he has devoted much of his adult working life in helping to bring about the very changes and solu-

NATIONAL URBAN LEAGUE
Pepper

tions he describes. His motivation can be traced back, in part, to some of the childhood experiences he shared with so many others.

Ray Scruggs was the sixth and last child born to James and Mary Louise Scruggs of Nashville, Tennessee. James Scruggs had been born into slavery. Mary Louise, ten years younger, was born free. The two met, married, had their family and set about instilling in the children a philosophy that was to serve them well: "If you want something badly enough, and work long and hard enough, you can attain it."

James Scruggs was living proof of that philosophy. Though he spent his whole life as a laborer, he worked more than one job at a time whenever he could. That effort, coupled with thrift, eventually enabled the Scruggs family to own not one, but two homes in Nashville.

Family pride tested

While Ramon was still a boy, his father died. Two of the other children died, too. Much as these losses hurt, instead of being torn asunder, the family drew an even tighter circle around itself. Each of the remaining children, two boys and two girls, completed not only high school, but went on to graduate from Fisk University.

As the youngest, Ray was constantly striving to break out from under the shadow of the older children's accomplishments. While attending Pearl High School, a strictly segregated school in Nashville, his Latin teacher took him aside and said that of all the Scruggs it had been her privilege to teach, he was, without a doubt, the dumbest. "Could he really be a member of the same Scruggs family that had produced such accomplished scholars?" she wondered aloud. His sense of family pride was being tested. Ray applied himself and finished Latin with something approaching a blaze of glory.

His first conscious exposure to racial prejudice, the inevitable confrontation of the time, occurred when he was about eight. As he tells the story: "My mother took me with her to an office building in downtown Nashville. She had taught me to take off my hat in the elevator in the presence of ladies. We got on an elevator with several white men and women. The men removed their hats—until the white women got off on a lower floor. Then they put their hats back on, in the presence of my mother. I can still remember my mother trying to explain it to me." Recalling it even now, Ray will sometimes quote the poem by Countee Cullen:

"Once, riding in old Baltimore
Heart filled, head filled with glee,
I saw a Baltimorean
Keep looking straight at me.

"Now I was eight and very small,
And he was no whit bigger,
And so I smiled, but he poked out
His tongue, and called me Nigger.

"I saw the whole of Baltimore
from May until December;
Of all the things that happened there
That's all that I remember."

Nonetheless, Ray still remembers his childhood days as being pleasant, even happy. Times were not unduly hard while he was growing up. World War I required some sacrifices, of course, but the year the war began, Henry Ford announced he was raising basic wage rates from $2.40 for a 9-hour day to $5 for an 8-hour day and a lot of Southern blacks began the long trek northward.

Things didn't stay so rosy, however. The year after Ray entered college, the stock market crashed. As he accepted his A.B. in Business Administration from Fisk University in 1932, the economy was at its lowest ebb.

Hardly the best of times

Still, fate was kind enough. Ray had applied himself in college and had come to the attention of Professor Paul Edwards, who headed the department of Business Administration. Professor Edwards had a theory, backed up by an exhaustive marketing study he had conducted, that there was considerable purchasing power in the black community waiting to be tapped by any business willing to approach this market in the right way. The right way, according to Edwards, was to employ black sales representatives.

His theory came to the attention of the people at the Rumford Baking Powder Company and they agreed to test it. Ray, and a fellow Fisk graduate, were employed as national sales representatives for a trial period of eight months. They were to travel around the country, persuade merchants in the black communities to stock the company's product, and then stimulate sales among ghetto residents. So successful were they that the trial period stretched on. But Ray, who by then had married, decided it was time to end the nomadic life. He began looking around for other employment.

With a sense of timing that he admits could have been better, Ray had gotten married in 1933, the year Franklin Delano Roosevelt declared a forced bank holiday. And he turned in his resignation to Rumford Baking Powder in 1935, the year the same administration established the WPA (Works Progress Administration) in a final, desperate effort to ease the nation's unemployment problem. Once again, it was hardly the best of times.

A headline story

However, through John Dancy, executive director of the Detroit Urban League, Ray was offered a job as director of the Green Pastures Camp for underprivileged Negro boys. "I was so happy to be off the road, I think I would have taken anything. What I didn't realize was, that since practically all Negro children in Detroit were underprivileged, the camp was open to all. We had some crowd."

The job was a seasonal thing but, fortunately, by summer's end, Ray had offers of three other spots. He accepted the position of Boys' Work Director at Detroit's St. Antoine YMCA. Like the Green Pastures camp, this branch of the "Y" was segregated. Ray directed activities there for nearly four years. Later, he would look back on these years as being among the most personally rewarding of his life.

A concern for others and a willingness to get "involved" were distinguishing features of Ray Scruggs' career at the Y. He might have stayed on there, content to help shape the lives of black youngsters, but once again, John Dancy of the Detroit Urban League was the factor. Through his contacts at Michigan Bell, Dancy and Ernest J. Marshall of the Detroit Board of Education staff knew the company was interested in hiring someone who had credentials similar to Scruggs'. Dancy and Marshall recommended Ray for the job and, following the interview, Ray accepted. The Michigan *Chronicle* spelled it out across its front page: *RAMON SCRUGGS GETS TELEPHONE CO. POST.* He became a commercial agent for the company, and its first black representative in management.

As a commercial agent, Scruggs was asked to call on former customers in the ghetto area who had given up their service when the depression struck. It was his job to convince them that times were better and that the telephone was a necessity, not a luxury. In less than a month the new business he brought in paid his salary many times over.

But there was a gauntlet to be run, too, another kind of testing. For example, he would often find the word "Nigger" scrawled on his locker, and on more than one occasion he would have to retrieve his coat from the middle of the aisle where it had been "accidentally" trampled in his absence. Dialect jokes were told within earshot to see how he would react. But the novelty broke against the restraint and dignity he was somehow able to maintain. The baiting stopped, and Ray began to make friends.

Segregated housing

He says, "People have often asked me, in light of the kind of reception I was getting then, why I stayed, why I just didn't quit. As a matter of fact, I was offered a job in 1941 that would have paid me a thousand dollars a year more, and that was a lot of money then. But I didn't take it. The Negro community in Detroit and Michigan had rallied behind me in all sorts of ways, and I thought I had an obligation to stay on. You've got to remember that when I was hired, in the Michigan Bell Headquarters building where I worked, there wasn't a single employee who wasn't white—not even among the house servicemen or porters or elevator operators. If I didn't stick it out, there was no telling when another Negro would be hired."

Such conditions were not limited to employment; they were, in effect, the general rule. And they applied when Ray sought to buy his first house in Detroit:

"In those days, as now, blacks were pushing out for living space. My wife and I purchased a small house in a white neighborhood, but the local judge ruled we couldn't occupy it because of a restrictive use agreement. We were too young and too poor to fight the case beyond the circuit court; we had to sell. But we didn't lie down and play dead.

Fighting back

"The judge was coming up for reelection. Whenever possible, I attended evening meetings in the Negro community where I heard he'd be appearing. I talked about what he had done. I upset some of his Negro supporters, but I was heard. Then complaints started coming into the company and eventually my boss called me in. He said some people were contending that, as a telephone man, I shouldn't be politically active. I told him I felt the judge's decision had been unfair. I told him that many of my friends felt the same way, and that we had a right to take our case to the people. He agreed with me—at least with the principle. We won that one in the election booths: the judge was soundly defeated."

Employment opportunities for blacks began opening wider at Michigan Bell—which was itself a leader in the area. (Of the six black AVP's in the Bell System this year, four began their careers with Michigan.) In 1940, Ray was asked to become manager of the Gratiot Public Office which was being established to better serve the needs of the black community. There were mixed reactions to such an office. Some felt that the opening of a black-staffed center in a black area was just another insidious form of segregation. Others looked on it, and the employment opportunities it provided, as evidence that the telephone company was anxious to meet its responsibilities. Ray looked on it as a definite asset. But not without its ironies.

"I needed some girls to handle customer contacts and clerical details. At that time the only black girls at Michigan Bell were its recently hired elevator operators. To give you an idea of how highly qualified a black girl had to be to displace a white, one of the black elevator operators I brought in to staff the Gratiot office had not only completed high school but had several years of college credit toward her degree. The same circumstances prevailed in all Detroit businesses at the time, of course. There were always a lot more blacks to fill the available jobs and it was only natural for a company to pick the cream of the crop whenever it could."

The girl Ray describes, Katheryn Sterrett, recalls that when she was hired by Michigan Bell, she was reluctant to tell anyone of her college work, fearing she'd be considered over-qualified for the elevator job. Later she was happy she did, since it helped her get the post in the Gratiot Office. Among her recollections, Katheryn remembered the kind of manager Ray was:

"A fine man, a complete gentleman. He set high standards, but he worked hard himself. He was always calm, never showed any temper. The only time I recall seeing him more than somewhat upset was the day the office was robbed.

"Two armed men came in that day, herded all of us into a washroom and threatened to kill us if we came out. Believe me, none of us did. They rifled the cash drawers and stole some money from my purse, but they didn't get into the safe which could only be opened with a key that the armored-car people carried.

Race riot

"Before he did anything else, Mr. Scruggs saw to it that I was reimbursed the money that was stolen from me personally. That's the kind of man he is."

Ray hadn't been at Gratiot very long when he began to sense the frustrations of the black community. At that time, black professional and business people couldn't rent office or business space outside the ghetto areas, and most of the time not even there. Consequently, they couldn't operate in the city's economic mainstream. Black physicians rarely secured internships or residencies in general hospitals; and even the city, county and state hospitals were closed to them as training and educational resources.

Almost without exception, no financial institution, mercantile company or utility would employ a black outside the traditional menial service jobs. The Detroit Street Railway would not hire black motormen or conductors on the grounds that the white public would not accept them. The Fire Department wouldn't hire blacks, contending that white firemen would refuse to live in the stationhouse with them. Ultimately something had to give. On June 21, 1943, the city exploded with racial violence. When it stopped, there were 34 dead and 700 injured.

A sense of frustration

"Gus" Calloway, recently retired assistant vice president, urban affairs, at Michigan Bell, had followed Ray into the business and worked with him when he was manager at Gratiot. He remembers the riot day well: "I got a call from Ray that morning; he heard rumblings that there might be trouble. He said I shouldn't attempt to go into the office on my own, that he'd come by in his car and pick me up. Well, we weren't sure what side it might come from, so we decided to play it safe and ride smack down the middle of the street dividing the black and white communities. Before we reached the office a brick smashed the windshield. We didn't know where it came from; we didn't stop to inquire. But, when we closed the office, we decided to make our way home through the black community where we felt a little easier."

The years began to go by and Ray continued to work as manager of the Gratiot Public Office. As he watched others move along, some of whom he felt were less qualified than he, a sense of frustration set in. He had talked about the problem with enough people to know that while the company had been ready to hire a black manager, it was still uncertain about promoting a black man into a position where white people would be reporting to him. He began to think seriously about leaving.

"Gus" Calloway, whose predicament was similar, recalls that he and Ray talked it over and finally decided that they would simply not give in. Instead, they'd bide their time and turn in such superlative performances that at least the quality of their work could not reflect against them.

Through all this, Ray continued to act not only as the Gratiot Public Office Manager, but as the company's unofficial ambassador in the black community. He made speeches, visited schools, attended meetings, served on committees and made his presence felt. In 1950, in large part as a result of his own initiative, he was offered a spot in Michigan Bell's Public Relations Department. He had begun winning some powerful friends both within and outside the telephone business. And "times" had started to change:

"In 1953, when I was president of my college fraternity's graduate chapter, we helped the times along. We had tried to reserve the ballroom of one of the Detroit hotels for a large social function, when the manager called a vice president at Michigan Bell to complain that I was putting pressure on them to get the facilities. The vice president replied that what I was requesting was not only legitimate, but clearly a moral right as well. We got the space, and more: it marked the opening of general hotel accommodations for blacks in Detroit."

Savoring a victory

To fully savor just how large a personal victory this was, Ray's sister, Mrs. James J. McClendon, reports that one year, to help finance his college education, Ray worked as a doorman at one of the Detroit hotels. While he was permitted to open its doors, park the guests' cars and jockey luggage, it was made plain to him that blacks were neither allowed to stay at the hotel nor to eat in its restaurant. After work he would return to his sister's and speculate on what it would be like to stay at such a fashionable place. Later in life, after the color barriers had dropped, he did just that. He reports that, like the greener grass on the other side of the fence, things were not nearly as elegant as he had imagined.

Through the 1950's, Ray continued active in black and Detroit community affairs. He served as vice president of the Detroit United Community Services, and as a director of the Detroit Tuberculosis and Health Society, the Michigan Society for Mental Health, and the Detroit Chapter of the American Red Cross. He was president of Alpha Phi Alpha, a black fraternity, from 1951 to 1954; president of the Detroit Urban League from 1954 to 1956; and served in a variety of capacities with the N.A.A.C.P., including the management of a special contributions fund. He was the first black trustee of the Children's Hospital of Michigan, executive director of Detroit's United Negro College Fund, and a member of the National Board of the YMCA.

Into a new career

In 1963, Ray accepted a transfer to AT&T as a manager in the Public Relations Department. He was told his duties would lie chiefly in working on the company's corporate contributions program. Before he had a chance to familiarize himself with the job, however, the vice president of Public Relations asked him to pack a bag and make a trip to Philadelphia.

When he arrived, he thought he was to meet with the personnel people on some minor problem. Instead, he was ushered into the board room where the president of the Pennsylvania company and the executive officers sought his advice on how to cope with the demands of a militant black group that was beginning to single out the company with denunciations and public demonstrations. Without realizing it, he was into a new career. As the word got around, Ray was being asked to consult with other Bell companies in solving a whole host of local problems involving minority groups.

When Ray and his family had arrived in New York in 1963, they encountered a local problem of their own. They had expected no particular housing complication in the more liberal eastern settings. They were wrong. Landlords in the East, outside the black ghettos, were most reluctant to open their buildings to a black family. Some were direct, others devious, but in either case, the Scruggs were having a hard time finding an apartment. Eventually, the *Newark News* picked up and printed the story of their difficulties, and shortly thereafter, Ray had a visitor. As he recalls it:

"After the article appeared, an elderly white man came to my office, introduced himself, and asked if he might come in. I said, 'Of course,' not really knowing what to expect. But he said: 'Mr. Scruggs, I've read about the trouble you're experiencing. My wife and I are going to California for six weeks. I have a home in Upper Montclair, and we'd like you and your family to live there while we're away. This will give you time to secure what you want. If you haven't gotten located by the time we return, there's plenty of room and you're free to stay as long as you wish.' Now this man had never met me or my family. After all the rejections we'd received, his kindness brought me new hope that decent people, regardless of race, will ultimately step forward."

Considering the long experience and struggle, why is Ramon Scruggs more optimistic about social conditions today?

"When I came to AT&T 10 years ago there were 29,000 black people working in the Bell System. Today there are over 100,000. All the Bell companies are actively recruiting blacks—as well as other minorities—and they're working to establish upward mobility as firmly as open hiring has been accomplished.

Some unfinished business

"Early this year, the Bell System signed an agreement with the Equal Employment Opportunity Commission and the Labor Department aimed at facilitating the movement of qualified women and minority group members into better jobs. I view this agreement and the affirmative action it pledges as evidence that the Bell System is taking further steps to continue its efforts to assure equal opportunity throughout the business. And, you've got to remember, we're only one company. Others are doing similar things.

"As I travel all over this country, I see black Americans in places and working at things in air terminals, banks, utilities, government offices, stock brokerages, service companies, and what have you, that would have been unheard of even five years ago. That's why I'm convinced that progress is being made."

What other changes would Ray like to see, what advice would he give?

"I'd suggest now that black Americans get down to the undramatic, unglamorous, hard work of some unfinished business. First of all, I want to see black teachers challenge the brainwashing of white educators who imply that black children can't learn. What this really means is that they haven't been taught and properly motivated.

The Whitney Young Award

"I want to see black professionals get to the job of providing more services that will compete in an open market. I want to see black businessmen follow the same line.

"I want to see black Americans who are moving into job situations on the non-professional levels adhere to the rules of punctuality and consistent attendance, and provide the high-grade performance they're capable of.

"But most of all I want to see white businessmen put their heads together and solve one of the biggest problems of all—what to do with minority people after they've been hired. Too many are hired into technical and staff positions in the Bell System, for example, and never get into the broader operations of the business. They end up as specialists without any perspective, and this handicaps them throughout their careers in assuming wider responsibilities.

"These people should receive rotational assignments in a variety of departments, assignments that expose them and the business to each other—and that expose them and the other people of the business to each other. I'm convinced that if this happens, everybody, including the business, will be better off."

Ray Scruggs admits easily enough that because he has worked within an established organization, some of the more militant black youth have regarded him as an "Uncle Tom." But he thinks that time is passing, that there's a new generation coming along that is more interested in results than recrimination over yesterday's injustices.

He tells the story of his very good friend, Whitney Young, now deceased, who was Director of the National Urban League. Young once speculated, as his train was going through Harlem, whether he should get off and stand on the corner cussing out "Whitey" to prove how tough he was, or whether he should go on downtown and meet with some executives to secure several thousand jobs for unemployed black people. He decided to go downtown.

Among the many awards he's received in his lifetime, including two honorary doctor's degrees, Ray Scruggs says he's most proud of the Whitney Moore Young, Jr. Corporate Excellence Award he was given in 1973. He has devoted 38 years of his life to serving the Urban League, and an equal amount of time, if less conspicuously, to the N.A.A.C.P. He not only admired Whitney Young; he felt privileged to call him his friend.

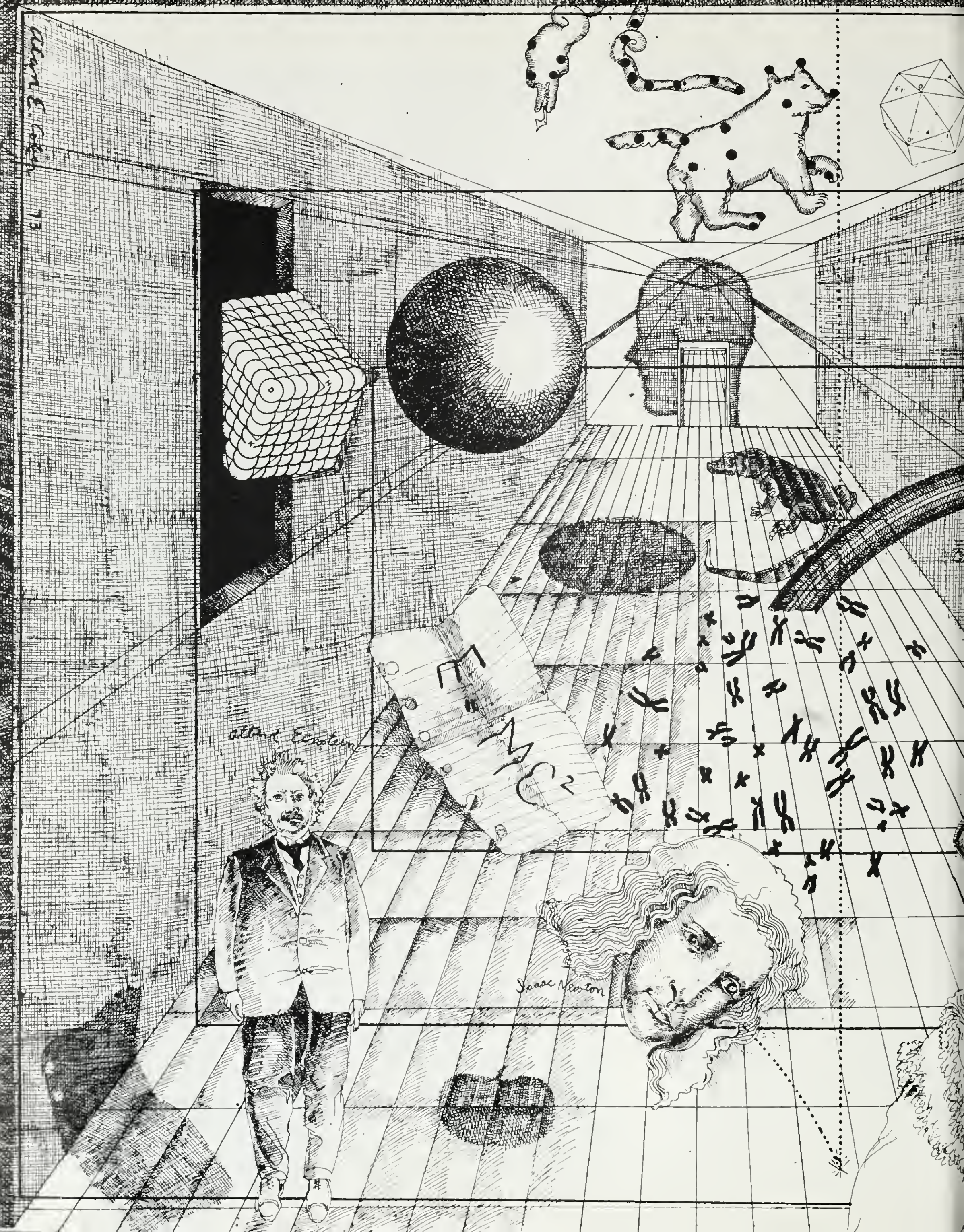
For a better world

As Ray Scruggs traveled from city to city in his capacity as AT&T minority affairs director, he would frequently conclude his talks with a quotation from Gordon Parks, the black photographer, essayist and film producer:

"We are not so far apart as it might seem. There is something about both of us that goes deeper than blood or black and white. It is our common search for a better life, a better world. I march now over the same ground you once marched. I fight for the same things you still fight for. My children's needs are the same as your children's. I too am America. America is me. It gave me the life I know—so I must share in its survival. Look at me. Listen to me . . . Try to understand my struggle . . . There is yet a chance for us to live in peace beneath these restless skies."

As more people of Ramon Scruggs' caliber step forward—and more men and women *will* follow him—the chance for such a peace becomes better every day.

William P. Kuhs, Associate Editor


Alan E. Cober
73
Albert Einstein
E = MC²
Isaac Newton

Why Science?

by
Dean Gillette

Once upon a time people looked at scientists much as they looked at witches and warlocks. The local scientists in those days were called alchemists, and some of the things they could do – dissolving gold or cleaning an asbestos tablecloth by throwing it in the fire–did look like witchcraft. They could make mercury by distillation, and may have been half mad from mercury poisoning. Some used spells and incantations; others thought that the phase of the moon was an important parameter in their work. But, in their own way, they *were* scientists. They were trying to understand the nature of the world around them.

Actually, we should not scoff at the alchemists' methods too much. Even today, we too wait for the right "omens" before embarking on some scientific ventures. Of course we call it "proper timing" when we wait for the right phase of the moon before an Apollo launch or look for a propitious arrangement of the planets before a Mars or Venus probe. And we say we are "scientific" about the whole thing because we "understand" rocket propulsion and celestial mechanics.

But once upon a time the study of celestial mechanics itself had social hazards. Galileo was in danger of the stake for challenging the geocentric theory of the universe. (Actually, his crime wasn't discovery of the moons of Jupiter, but questioning the doctrine of the establishment.)

Later on, society seemed to recognize the difference between the objective of science – discovery of new knowledge – and that of technology – exploitation of discoveries to develop new products and services. Both were respectable and highly regarded. Ben Franklin's conclusion that lightning is electrical in nature is reported in children's history books, and people happily accept technical developments like the telephone. Most of society, too, knows that development of the Bell System network would not have been possible without the earlier discoveries of such

---

Mr. Gillette is Executive Director, Communications Systems Research Division, at Bell Telephone Laboratories, Whippany, N. J.

scientists as Farraday, Maxwell, Ohm, Volta, and Ampere who were concerned with electricity and magnetism, not telephony.

But there still seem to be a few people who think that today's scientific magicians are simply entertainers, and are not concerned with social good. Indeed, some observers are quite vocal in challenging the directions that both science and technology are taking. A few even suggest that science and technology are leading the way to a world disaster. The gentlest sort of criticism is that of Ralph Lapp:

> "No one–not even the most brilliant scientists alive today – really knows where science is taking us. We are aboard a train which is gathering speed, racing down a track on which there are an unknown number of switches leading to unknown destinations. No single scientist is in the engine cab and there may be *demons at the switch*." (Emphasis added.)

At the same time that some social observers worry about the direction and pace of technology, others demand more from our economy. To the fundamental human rights of life, liberty, and the pursuit of happiness, our society has added the right to nutritious food, health care, housing, education, transportation, and communications–for all, not just the affluent.

Productivity growth

We want more material goods for more people, but do not seem to be increasing our productivity as rapidly as in the past. Between 1960 and 1970, labor productivity in the U.S. increased 35 per cent. That may seem like a lot, but in the same interval the productivity in Japan increased 188 per cent; in West Germany, 74 per cent; and in the United Kingdom, 40 per cent. Technological progress and productivity go together. Economists have estimated that the "advance of knowledge" or technological change, led to about 40 per cent of the increase in national income per person between 1929 and 1957.

We are beginning to see a conflict in reaching two desirable social goals: we recognize new "rights" to material things whose production requires more technology; and we are concerned about the social and environmental effects of continued technological advance. The real problem seems to be that sometimes technology has been used to increase human productivity without regard for such side effects as pollution, exhaustion of natural resources or destruction of the land. The magic for the future, some say, is not to abandon technology, but to tame it.

Technology's side effects

Certainly it makes sense to think seriously and quantitatively about the side effects of introducing new technologies and systems. Almost any time we make a change in our physical surroundings, there will be some long-lasting consequences. Even plowing a field to install a new coaxial cable disturbs the soil enough to leave a trace that may show up in aerial photographs for centuries. Comparison of the gains and losses that result from the introduction of new products is called "Technology Assessment" and its proper application can have long-term benefits for the nation. But we must be wary of attempts to extend "Technology Assessment" to include "Science Assessment."

Most observers do not *directly* challenge science, but rather the impacts of technology based on it. However, there may be a debilitating *indirect* attack on science if other social challenges are pressed.

One danger is abandonment of science and technology by bright minds that could help solve the dilemma. And there *is* abandonment. In both 1971 and 1972, freshman engineering enrollment was down 17 per cent. A National Science Foundation study predicts, for the next decade, a significant undersupply of chemists and physicists, a slight undersupply of engineers and earth scientists, a surplus of mathematicians, and a significant surplus of life scientists.

Another danger would be an effort to channel *all* science into areas that are, at the moment, judged particularly desirable. There are trends in that direction, too. In the last few years a number of major industrial research laboratories have either focused on product development, have shrunk in size, or have disappeared. (Bell Labs is not among these.) And although the amount of government-supported research is growing, there is a national interest in emphasizing selected areas of scientific research. "Technological Forecasting" is one method used in making such choices. In one popular technique, "trend extrapolation," a forecaster considers what has happened in the past and assumes that future events will follow what seems to be a pattern. A second, the "Delphi method," relies on statistical analysis of a collection of personal opinions about what will happen in the future.

Technology Forecasting, coupled with Technology Assessment, can be a perfectly sound way to explore the opportunities for development of technology that is based on old discoveries – the past products of science. But new kinds of responses to social needs can only spring from new discoveries. A scientific breakthrough is the result of pushing at the limits of knowledge from the inside, with feet solidly placed on well-understood foundations; new discoveries do not happen just because someone pulls on the boundaries of knowledge from the slippery outside ground of wishes. Let's look at examples of the interplay between discovery, development of new technology, and need.

Discovery of waveguide

The waveguide as a means of transmitting hundreds of thousands of conversations simultaneously was discovered 40 years ago. The technology was developed, and there have been applications of the waveguide as a radio system component for decades. The demand for waveguide as a long-distance transmission medium will only in the late 1970's be great enough to make it economically attractive. Discovery and technology led need.

The communications satellite was "discovered"–that is, suggested –in 1945 by the British scientist and author Arthur Clarke, and the need for it as an overseas communications link was immediately obvious. Technology to capitalize on the discovery at a reasonable cost was not developed until the late 1950's, when John Pierce at Bell Laboratories recognized the use that could be made of contemporary space vehicles. Discovery and need led technology.

Optical communications over glass fibers was studied in the late 1940's, but there was no known way to produce the right kind of light. We knew how to generate coherent electromagnetic radiation at microwave radio frequencies, but not at visible light frequencies. We knew we needed coherent light for broadband transmission, but had to wait until the laser was invented before we could build broadband optical communication systems. Now we think that coherent light and optical fibers can be combined, and are working to bring together all of the other components needed for a system: modulators, detectors, filters, couplers–even ways to splice bundles of optical fibers.

Use of the laser

Surely Arthur L. Schawlow (at BTL) and Charles H. Townes (a consultant to BTL) knew of the communications values of new means of signal amplification when they invented the laser. But the earliest applications of the laser were not in communications but in other fields–where there were other needs. The first practical use of the laser was to drill holes in diamonds to make cheaper wire-drawing dies. Then, scientists in the medical field recognized that a laser beam could be made sharp enough and hot enough to be a precision cauterizing device, and capitalized on the discovery by development of an instrument and a process to repair a detached retina in the human eye. Knowledge of human physiology coupled with invention of the laser –two separate fields–led to this new means of saving human sight.

Fundamental knowledge is really a codification of the discoveries of earlier investigators and provides the base needed for many inventions to meet direct and immediate needs. For example, the plastic used for insulation of wire pairs in cable was found to flake off when exposed to air and the temperature of some environments in Arizona. Bell Laboratories chemists found that the process was actually a chain reaction, catalyzed by the copper in the wires. They developed a new set of additives for the plastic that deactivated the copper catalysts, and that stopped the chain reaction. They could do this quickly because of knowledge gained through years of scientific investigation into the fundamental physical and chemical properties of long-chain polymers from which the plastic is made. Invention in this case was certainly motivated by the very practical need to stop destruction of insulation in cables.

But many discoveries come as the result of research carried out simply to learn more about the world around us. The discoveries are often the basis for big steps in the evolution of technology. For example, for years there was a laboratory curiosity called superconductivity – a phenomenon in which some materials appear to have no ohmic resistance when cooled to near zero absolute temperature. What good are superconductors? Well, since the strength of an electromagnet is determined by the number of turns of wire times the current carried, we should be able to build fabulously strong electromagnets using superconducting wire. We should be able to–except that high magnetic fields destroyed superconductivity in the known materials. Then J. E. Kunzler, working at Bell Labs' Murray Hill installation, showed that an alloy called niobium-three-tin *would* be superconducting in high magnetic fields. There is some work now to use supermagnets to lift high-speed trains and reduce rail friction – exploitation of a discovery never forecast.

Glassy metals

There are other "curiosities." A familiar one is the work of Karl Jansky, in the 1930's, at Holmdel. While seeking the cause of radio static interference in transatlantic radio-telephone service, he discovered the radio noise of interstellar space. That was the beginning of radio astronomy which, in turn, produced results valuable for development of satellite communication systems. More recently, Arno Penzias and Robert Wilson, also at Holmdel, using ultrasensitive microwave receivers they built at Bell Labs and used at the Kitt Peak National Radio Observatory, found that interstellar space is full of all kinds of things: cyanides, sulfur, carbon monoxide, and so on. And at Murray Hill, chemists are studying a new kind of material: glassy metals. They are metals in that they conduct electricity; they are glasses in that they have no crystalline structure; and oddly enough, they have a tensile strength almost twice that of carbon steel. The motivation for their work is simply the search for a better understanding of the nature of materials. New discoveries in glassy metals may lead to other discoveries in the materials for telephone systems, but there is no specific need forecasted. Indeed, if all technology were tamed and harnessed, scientists would probably not even have discovered glassy metals or superconductivity.

Assessing technology

New technology can help provide the goods and services that will improve the "quality of life" for everyone. Assessment of technological impact can be a part of the decision to develop new systems and a part of the engineering and design of new facilities. And analysis of the pace of technology is useful in studying alternatives for the future, in selecting development areas for emphasis and for engineering and manufacturing scheduling.

But without a growing base of fundamentals, changes in products and services would only be the result of rearrangements or the reflections of new styles. Dramatically different technical approaches can only result from exploitation of new basic knowledge. Even though it is impossible to predict just what a discovery will be, or when it will be made, it is easy to see that there will be no discoveries without vigorous programs of scientific research. Discovery is the mission of the inquisitive, exploring, and, above all, unscheduled minds of scientists.

Of course, some of the effects these curious minds produce do seem like witchcraft. ☐

Sandia

A look at some of the more notable civilian applications deriving from its nearly 25 years of service to the Atomic Energy Commission.

Sandia Corporation, Western Electric's little-publicized, not-for-profit subsidiary that does such a big job for the Atomic Energy Commission, will celebrate its silver anniversary next year.

Although nearing the quarter-century mark of Bell System affiliation, Sandia is rarely spotlighted in telephone company publications. That's not too surprising when you consider that much of the work Sandia does for the AEC is secret, and that which isn't hush-hush has little direct application to the field of telecommunications. Lack of Bell System publicity, however, in no way diminishes the importance of work Sandia performs.

Sandia's primary job is research and development on the non-nuclear portions of our country's arsenal of nuclear weapons. That includes not only the arming, fusing and firing systems and their individual components–power supplies, timing mechanisms, radars, and switches–but the electronic locks and containers which prevent unauthorized use of the weapons.

Sandia does not manufacture or assemble weapons components or systems. That work is done by other contractors working from design specifications provided by Sandia personnel. However, Sandia is responsible for non-nuclear quality assurance. This involves careful acceptance criteria for items being manufactured and a complete and thorough testing of weapons in stockpile to assure their continuing safety and reliability.

The reason for the rigorous testing is plain. Nuclear weapons, if needed, must work the first time. There may not be a second chance. On the other hand, as weapons are stored, distributed or used, there must be no danger of accidental or unauthorized detonation.

The safety of Sandia's weapons design was put to a severe test in 1966 when a B-52 armed with thermonuclear bombs crashed in Spain. Three bombs plummeted to earth without exploding. The fourth, which landed in the sea, was brought up from within the impact area determined by Sandia experts, the case dented but the explosive device intact. In a separate, somewhat less dramatic incident, a plane carrying nuclear bombs crashed in Greenland in 1968. Again, there was no explosion.

Sandia's sophisticated weapons development work is such a far cry from the world of Trimline® telephones, automatic PBX's and long distance telephone calls, it might be well to review how Sandia became part of the Bell System family. As might be expected, we did not actively seek involvement in the type of work Sandia was set up to do.

Sandia was established in 1945 as part of the Los Alamos Scientific Laboratory to handle future weapons development engineering and bomb assembly for the "Manhattan Engineering District," the code name given to the original atomic bomb project. It was operated by the University of California until 1949 when the University, deeply involved in other aspects of the program, asked to be relieved of this particular responsibility.

The AEC had long been impressed with the organization and operation of the Bell Telephone Laboratories and the manner in which its discoveries flowed smoothly from design into Bell System manufacture, distribution and use. AEC Chairman David E. Lilienthal urged the Bell System to bring its managerial and organizational expertise to the Sandia operation. To cap the argument, President Harry S. Truman made a personal plea that the Bell System take on Sandia's vital defense work. AT&T agreed, but on condition that it be a public service, without profit to the Bell System. Western Electric then created the Sandia Corporation as a subsidiary, working for the AEC under a five-year contract. Western Electric receives no profit and charges no fee for the Sandia operation. The contract has been renewed every five years.

When the Sandia Corporation was created, its principal facility was the Sandia Laboratory, mainly a cluster of temporary buildings located on a remote stretch of sun-baked mesa south-east of Albuquerque, New Mexico. Those temporary structures were, however, the beginning of one of the nation's most diversified and sophisticated scientific and engineering laboratories. Today, Sandia Laboratories at Albuquerque is the corporation's headquarters. Most of the temporary structures have now been replaced by permanent, climate-controlled

buildings, but the scientific instrumentation they contain is still, in many cases, the envy of scientists and engineers the world over.

Another facility, Sandia Laboratories, Livermore, located in the San Francisco Bay area just east of the city of Livermore, California, was established in 1956 to provide a closer working relationship with AEC's Lawrence Radiation Laboratory, now called Lawrence Livermore Laboratory (LLL). LLL and the Los Alamos Scientific Laboratory design the nuclear explosives systems, which utilize the Sandia ordnance to create completed weapons for military use.

In addition to the laboratory facilities at Albuquerque and Livermore, Sandia operates the Tonopah Test Range some 30 miles southeast of Tonopah, Nevada. The range covers 625 square miles and is used primarily as a ballistics range for testing devices dropped from aircraft or launched by rockets. Other smaller Sandia test facilities are located at White Sands, Holloman Air Force Base (N.M.), Point Mugu (Calif.), Santa Cruz Island, Cape Kennedy, Kauai and Kwajalein Island.

All buildings, equipment, real estate and other assets used by Sandia are owned, of course, not by the Sandia Corporation, but by the Atomic Energy Commission. The AEC's capital investment in Sandia facilities now exceeds $310 million, with more than $250 million of that amount invested in laboratory and test facilities at Albuquerque.

Sandia currently employs about 6,400 persons (down from a high of 8,000 employed in 1968-69). Approximately half of the people are in technical and scientific positions and the remainder in crafts, skilled labor and administrative classifications. The lion's share of these employees (some 5,500) are located at Albuquerque and their presence in and around the city has had a noticeable impact on the post-war economy. Sandia's $100 million payroll is a significant factor in the community of 250,000 people.

Several significant changes occurred in the nuclear weapons program during the past decade. The limited test ban treaty halted atmospheric and underwater testing and forced a shift to underground testing and to simulating nuclear weapons effects in the laboratory. As a result, Sandia sharply increased its participation in underground tests at the Nevada Test Site and its use of nuclear reactors and other means to study the effects of radiation on various materials.

Civilian spinoff

In the course of its research to solve weapons development problems, Sandia discovers and develops new materials, methods and skills that have application in the civilian sector of the economy, as well. The AEC has first priority in patenting any Sandia discoveries, but when such "spinoff" applications occur, and national defense policy permitting, the AEC allows the patented items to be manufactured under royalty-free, non-exclusive, revocable licenses.

Some of the spinoff technology seems destined to have even broader civilian use than the narrow military application for which it was originally developed. Electro-optic ceramics is a case in point.

These Sandia-developed materials have a number of interesting applications. For example, Labs scientists have used the ceramics to develop a pair of electrically-operated eye-protective goggles so sensitive that they blink from a near-transparent state to almost total opacity 5,000 times faster than you can wink your eye.

Originally conceived as a means of protecting pilots from the eye-damaging flashes of nuclear explosions, the goggles contain a ceramic plate sandwiched between two cross-polarizers. Flash hazard is detected by an array of five photodiode "sensors" located between the lenses. When the sensors detect that light is reaching a damaging level, they switch the goggles to their "off" state. When a safe level is again reached, the lenses automatically clear. The goggles are powered by a small battery and may be switched on and off indefinitely without deterioration of the lenses.

What are the civilian uses of this innovation? The first and most obvious application is to incorporate such lenses into the metal masks worn by arc welders. If you've ever watched an arc welder at work, you know he spends a substantial part of his time raising and lowering his visor, as he positions his work and makes his weld. A mask incorporating the new electro-optic ceramic material would save the nuisance of flipping that visor back and forth and should enable the man to produce better welds with less effort.

Sandia has received hundreds of requests for information on where the goggles may be purchased. While a number of optical companies are experimenting with the materials, none have yet developed a marketable product, but it appears that it will only be a matter of time before they do.

The Sandia scientists who developed the goggles, C. B. McCampbell, G. H. Haertling, J. T. Cutchen and J. O. Harris, also point out that had such a lens been used on the Apollo TV camera that burned out when it was inadvertently pointed at the sun, that camera might still be working and capable of sending back valuable information to earth. Equally important applications could be made of the material in photographic lenses and filters.

One relatively early Sandia discovery, the use of ultra-clean air to reduce contamination when assembling subminiature electronic components, was made available for industrial application more than ten years ago. Today, there are at least 40 firms in the business of designing, manufacturing and installing the highly effective laminar-flow clean rooms, clean benches and related equipment.

Electro-optic ceramic material in these goggle
protects eyes from the brilliant light of the flas
Laminar air flow technology, another Sandia
opment, was first used here at the operating s
Bataan Memorial Hospital in Albuquerque.
engineers examine part of an earth-penetrati
jectile used to measure Arctic ice.

The inventor of the laminar air flow clean room, Sandia physicist Willis Whitfield, is particularly pleased at the large number of hospitals that are making use of the technique in operating rooms. The first time laminar air flow was tested under surgical conditions was in an operation on a dog in 1962. It wasn't until 1966, however, that the nation's first laminar air flow operating suite was opened at Albuquerque's Bataan Memorial Hospital. Now, hundreds of hospitals all over the world are installing such suites.

The principle of laminar air flow, like most great inventions, is simple. A carefully controlled supply of air is sent through a bank of highly efficient filters, which remove all particles over a millionth of an inch in diameter from the air. This super-clean air is gently pumped down over the work area in uniform layers or laminations at a speed of approximately one mile an hour, carrying away through floor grates virtually all airborne particles.

Western Electric uses the principle in many of its clean rooms, as do

most other micro-electronics manufacturers. In addition, NASA uses such a room for the assembly of space vehicles, and pharmaceutical houses find similar facilities useful for the preparation and packaging of certain drugs and antibiotics.

Along related lines, Sandia's Biosystems Research Department has been hard at work investigating the effectiveness of still another sterilizing technique—"thermoradiation" —which is the simultaneous application of heat and gamma radiation to kill certain bacteria.

The synergistic sterilizing effect produced by simultaneously applying heat and radiation has been noted by various investigators through the years. However, no systematic analysis was made of the phenomenon until early 1969 when a Sandia research team, supported by NASA funds, began to study it as a possible means of sterilizing interplanetary spacecraft.

By late 1969, the Sandia team had not only found that thermoradiation is effective against several bacteria, but that it substantially shortens sterilization times and permits the levels of heat and radiation to be greatly reduced.

As a means of sterilization, thermoradiation appears to have been overlooked by other researchers largely because its synergistic effect is evident only in certain temperature and radiation dose rates. Sandia's Biosystems Research people have been carefully plotting the effects of thermoradiation on a variety of bacteria. From their studies have come mathematical models in the form of three-dimensional computer graphs which show the effectiveness of the technique under a variety of tradeoffs between temperature, radiation dose rate and sterilization time. This makes it possible to predict optimum dose rate-temperature combinations.

The reason scientists have been interested in using this particular sterilization technique is fairly simple. Certain substances react negatively to sterilization using either high heat or heavy gamma radiation alone. These same substances may react favorably to thermoradiation which has the potential of killing off the bacteria without injuring the substance. The application of this technique could be very broad.

Protective goggles, ultra-clean rooms and thermoradiation have obvious applications in the civilian sector of the economy, but how do you apply the study of the penetrating power of various projectiles to anything but military use? Strange as it may seem, such studies do indeed have peaceful applications.

For many years, Sandia has been experimenting with specially instrumented earth-penetrators dropped from aircraft or propelled by rockets. On striking and penetrating the ground the projectiles transmit data to a receiving unit on the effects the various layers of rock and soil have on the projectile's deceleration. A new branch of earth science, called terra-dynamics, has built up around such experiments.

Sandia has learned that the ideal penetrating projectile has a length at least eight times greater than its diameter. This shape keeps the vehicle from tumbling or twisting when it passes through the earth. Sandia has experimented with projectiles weighing from five to 6,000 pounds, with diameters from one to 18 inches, impacted at velocities from 60 to 2,750 feet per second and with average decelerations of from 10 to 2,500G's in materials ranging from soft mud to granite.

Measuring Arctic ice

Using penetrometers it designed, Sandia has completed a highly successful series of remote sea ice measurement tests in the Arctic, conducted for the U. S. Coast Guard. The penetrometers relayed information about the thickness of the sea ice to within 2½ inches of accuracy, in ice ranging from one to six feet thick. The Coast Guard expects to use Sea Ice Penetrometer tests as part of its regular research program in the future for such work as charting sea lanes and ice breaker paths.

As the techniques are mastered, Sandia expects such penetrometers to be helpful in geological surveys of subsurface materials in remote areas, in extra-terrestrial exploration, to locate water tables and to determine locations for implanting deep-sea anchors.

While Sandia devotes less than 10 per cent of its energy to projects of a non-military nature, the Labs receives hundreds of requests annually for information on its non-military, spinoff technology.

The late President Lyndon B. Johnson, commenting on the merits of sharing this information, once said, "Spinoff is a bonus to the taxpayer, since it represents an extra return on money originally invested for a different purpose. It's a bonus to industry and to the consumer because it leads to improved, or more economical, processes and products.

"And because we are sharing our non-military nuclear technology with other countries, the bonus is shared by people everywhere."

As they near 25 years of Bell System affiliation, the men and women of Sandia Laboratories are proud of the dual service they and their company perform: keeping this country militarily prepared, while sharing accomplishments which better the lives of everyone. □

JUST BETWEEN YOU AND ME

BY BAILEY MARKHAM

That's where essential communication takes place—between two people, face to face—and where productive supervision is best fostered.

There are certain misconceptions about communication that are standing in the way of greater corporate success. The first of these is the confusion as to what communication is. Far too many managers see communication as being in competition with other priorities and objectives.

They see communication as something to do when they've gotten the service problems, the productivity problems, the maintenance problems, etc. under control. "My boss wants these taken care of first," they say. "Then we'll sit down and talk to our people." This point of view does not realize that communication is a *process of achieving goals,* not a competitive goal itself. Goals are achieved through the full involvement and support of each employee involved. This comes through the total communicative process, the total interaction of people with people. It thus cannot be in conflict with, but serves rather as a means to, successful achievement.

A corollary attitude is that communication time is "non-productive time." The short-range view is that time spent off the job must mean less time devoted to the job. But the long-range view is that this communicative time away from the job function brings about greater ability to deal with the function successfully in the time spent on the job in the future. It more than pays for itself, long-run. The realization of this is very rare.

Many managers feel that face-to-face communication will take place only when it is ordered from the "top." But should one really wait to do what managing is all about—namely, accomplishing goals through others, which is itself done through communicating? Nonetheless, if we need any examples or any words, we no longer need to wait on that score, either. The miles traveled and the time logged by the present Bell System leadership in getting out and talking *with* employees is overwhelming. And their words have been supporting their

---

A former Division Traffic Manager with Illinois Bell, and the first to head that department's Human Resources Division, R. Bailey Markham is now Employee Information Director—Employee Discussion Programs at AT&T.

actions from the beginning. As John deButts wrote, not long after assuming the Chairmanship:

"I think we must find ways to involve our management people more directly in the search for right answers to the issues confronting our business. . . . It is that search that makes my job interesting—and yours, too, I hope. We must learn to share it. . . . In my view we can't do that with pieces of paper. We must talk with one another more. We have begun to do that on a System scale in our more frequent meetings with the presidents. As a consequence, I think we know better where we want to go. If we can generate the same candor in communications throughout our companies, there is no problem we can't solve, no difficulty we can't surmount, nothing we can't do."

An observation that might be noted in this regard, though—and flagged for action—is that we fail to hold people responsible for their communication. It is basically not in the reward system and only to a minor degree is it used in appraisal discussions. This must be changed if the communication job is to be accomplished. The people side of the business must run hand in hand with service and productivity-earnings. They are interdependent.

Also to be noted is that there are other aspects of interpersonal communication that have significant meaning to the Bell System beyond employee performance.

System studies show, for example, that the attitudes of customers who know people who work for the telephone company are definitely affected—for better or for worse—by their impressions. Today's business climate is such that customer understanding and support was never more needed. With more than 1,000,000 employees in the Bell System, the opportunity to affect customer attitudes is great. An employee who has been communicated with and brought into the mainstream of the business is an employee who will in turn communicate positively with the customer. But a lack of communication can be a detriment.

Just about every survey of attitudes as well as information media throughout the System gives substantial evidence that large portions of both management and non-management levels feel a lack of effective communication: they are not sure of the overall goals of the System, their company, their unit; they don't see where they fit in; they don't feel their ideas are sought or their talents fully utilized; they believe upper management is being less than candid in matters relating to personal performance and opportunities; they maintain there is not full understanding of what their task is really all about.

Several previous articles in *Bell Telephone Magazine* have discussed this subject in some detail, and from varying perspectives. For example, AT&T Publications Director Jack Howland's feature called, "Talking At or Talking With?" and the recent piece by New York Tel's Al Wood on "The Open Door, The White Knight, The Wrong Preposition" (March/April '71 and '73, respectively).

The subject is also implicit in the "Work Itself" or Job Restructuring program, and in the material published on it, including considerable treatment in these pages. And just a few months ago, Board Chairman deButts sharpened the focus considerably when he asked:

"Is it any less important than it once was that managers in our business—even though it employs a million people—show themselves to be interested—personally interested—in each of the people reporting to them? I don't believe it is. I believe that if we no longer have the time we must take it to treat every single human being in our business as a unique individual with unique needs and hopes and aspirations and each in his own unique way important to the job we have to do together."

That, primarily, is the task of communication, which is essentially a process of relating, a process of managing. Achievement of goals comes through the performance of *people*. People create service; people make profit possible; people produce; people control expenses; people persuade, lead, convince; people learn about and respond to their community; people have skills, ideas, suggestions. In short, people move the business, and it is the potential power of individual employees that the supervisor works with. An individual is an individual, of course, because there is no one else quite like him. One way or another, each of us comes from a different background, reflecting different relationships, different cultures, different understandings.

The supervisor has to enlist the abilities of such individuals and achieve results through them—individual and team results at the same time. The supervisor achieves results through the performance of *individuals* who come together for a certain number of hours every day as operators, installers, and service representatives to form units and divisions and departments which provide the operator, installer and service representative functions.

The research that social scientists have undertaken in the areas of why people do as they do in the work environment has been thorough, documented, analyzed and applied. Our own Dr. Robert Ford is prominent among the pioneers in the field, among such names as Blake, McGregor, Herzberg, Maslow, and others. But no matter how diverse has been some of their thinking, no matter how different their approach, they have all recognized the value, the uniqueness of the individual. They have explored his motivations and what turns him on and off. They have picked apart and have given scientific basis to causation, responsibility, need, relatedness, growth and other difficult concepts with which a supervisor must deal.

The results of their research are validated in the words used by our employees in our own survey results. They say the same things as the social scientist, in very concrete ways. The greatest needs seem to center in two main areas: the need for a belief in self worth, and the need for a belief in job worth.

A strong belief in self worth is built, for employees, on these foundations:

- Their skills, talents and ideas are sought and used and they are aware of it.
- They know that they are participating not only in their own destiny but in the destiny of the corporation, something larger than themselves.
- They have the opportunity to show what they can do by being allowed to make judgments and mistakes without risk of having their selfhood attacked.
- They know where they stand, how their performance is viewed; they know what possibilities are open to them and that someone is concerned about the path their careers will follow.
- They can criticize, ask, suggest and receive fair hearings in a climate of trust and candor.
- The supervisor is willing to share the concerns, directions, plans and problems of the business with them.

A strong belief in job worth is brought about:

- By the knowledge that a job is meaningful in itself and in relation to its part in the corporate whole.
- By a chance to see what the job contributes.
- By knowing that the job is challenging their talents.
- By full knowledge of what the job demands.

Bob Ford's most significant work with job content and design across the Bell System is achieving momentous strides, seeking to make job worth an integral part of every employee's life. (See, for example, "Let's Talk about Job Enrichment," *BTM*, May/June 1973.)

An employee's feelings of self worth and job worth do not just happen. They are communicated day in and day out by the actions and words of the supervisor and others in the corporation. And in many small ways and some large ways, there is increasingly demonstrable recognition throughout the System that the preeminent resource we have is employees, that their full involvement, understanding and support are necessary to the survival of our enterprise.

One piece of evidence is the current emphasis on a process known as Management By Objectives (MBO). Most managers hold that objective setting has been part of the managerial function for years. And they're right. The significant difference, however, is the scope, detail and process of MBO, whose principal elements are these:

- A detailed written list of responsibilities agreed to by supervisor and subordinates.
- A detailed written list of goals and objectives describing in terms of priorities, timing, methodology, etc., how these responsibilities will be accomplished and measured.
- Periodic reviews during the year.
- A formal review at year's end which becomes the basis for appraisal of performance.

The payoff of MBO is not in discovering new responsibilities. The payoff is in the process of dialogue between supervisor and subordinate which communicates where a person stands, how his performance is perceived, what needs to be done and plans for how to do it—and which develops a climate of understanding wherein both parties really begin to know what each other is all about.

Other evidence of increasing concern lies in the wide range of methods being used to bring varying levels together within management, and between management and nonmanagement, on a more frequent basis. Informal sessions, with unstructured agendas and time for "rapping," are giving employees the opportunity to test decisions, to make suggestions, to get attitudes out in the open, and to get to know their supervisors better. Some of these sessions are held during working hours, some not. Some are held in large groups, with prepared presentations that lead to question and answer sessions, and some are the

informal gatherings mentioned. But communication barriers dissolve when people are given the chance to be heard as the individuals they are.

Almost all companies have established question and answer programs under such names as "Speak Out," "Answer Back," and so on, substantiating the active concern of the employee body on almost any imaginable subject. The success of programs appears to demonstrate the belief on the part of employees that anonymity will be protected and that the company is willing to deal candidly with the tough questions. However, they may also suggest that the immediate supervisor is not wholly regarded as the best source of information, and this in turn may suggest, among other things, that supervision generally is not relating as it should.

Fewer companies have active paid suggestion plans, but the number is increasing. Employee suggestion plans address another area of human need; i.e., the desire to participate fully in the company's destiny by contributing above and beyond the opportunities offered by the job function alone.

Another area utilizing the talents and ideas of the employee body, lies in the formation of small groups, both management and non-management, that help deal with specific matters of corporate concern. The groups might involve themselves in resolving exchange area problems, or they might take on some particular aspects of customer service. In still other cases they may concern themselves with corporate policy in external affairs.

But all these programs are designed to open up channels of communication so that employees can move into the mainstream of the business through participation and acquisition of knowledge. If that is so, if all these channels of communication are beginning to open up across the System, why all the drum beating about the old saw of face-to-face communication?

Well, if one thing is obvious, it's that our business is expanding, changing and becoming more complex almost every month. In fact, it has become trite to say so. Satellite communications, FCC investigations, interconnection, Affirmative Action, international DDD, construction budgets in the billions, 100 million telephones in service, BIS—the list of changes and innovations and demands that we've experienced in a comparatively short time is massive. The list will certainly grow apace as the telephone business not only continues to expand its services but becomes even more intimately involved with its corporate responsibilities in social and environmental affairs.

Every single employee today plays a part in the company's ability to meet its challenges. To play that part, he or she should be made aware of its significance. When individuals are frustrated in seeking the level of their competence, when they do not have a chance to give the fullest measure of their talents, the feelings of self worth and job worth so necessary to their optimum performance are diminished. And when individuals fail, the company begins to fail.

Most of our employees spend a substantial part of their waking hours working for the company. Therefore, it is not unreasonable to say that their feelings about themselves and their jobs have a profound effect on their lives. The attitudes and beliefs that have been communicated by the company to the employees about themselves and their functions in a positive, motivating way will bring about a greater chance for a total, positive person. This affects their entire environment and that environment in turn affects the company.

Far-fetched? Study yourself and how your job life and total life interact. When your feelings of job worth and personal worth are low, how is your attitude toward other things around you?

Employee support and understanding must be nurtured, developed over periods of time. They cannot be aroused spontaneously or just at those times when they are needed. Achieving both begins with an understanding of *them*, not the other way around. Understanding, support and commitment are built on a day-to-day basis. They are lost the same way.

The key, as every survey ever taken in the Bell System indicates, is the kind of supervision that "relates" to each employee. Thus the key is you and me. Only we can solve the communication problems in the day-to-day job. The climate we create—the care we use in nurturing people by knowing and understanding and listening to them —these are the essential beginnings of a long, slow process. But a more rewarding one for our business I cannot imagine. ☐

SAINT LOUIS
MO.
BULK RATE
U.S. POSTAGE
PAID
PERMIT 462

KANSAS CITY PUB LIBRARY 001
PERIADICAL DEPARTMENT
KANSAS CITY MO 64106

American Telephone and Telegraph Company
195 Broadway, New York, N.Y. 10007

Moving? Please inform the *BTM* circulation coordinator in your Bell Company's Public Relations Department. **Please include the mailing label from this issue.**

Printed in U.S.A.

Printed on recycled paper.

REYNOLDS
BINDERY, INC.
JUNE1975